

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

Reg. U. S. Pat. Off.
Established 1902

Volume 59

Number 3

NORMAN G. SHIDLE, Directing Editor
JOHN C. GOURLIE, Managing Editor
P. M. HELDT, Engineering Editor
D. M. McDONALD, Ass't News Ed.
LEWIS C. DIBBLE, Detroit News Rep.
ROBERT L. CUSICK, Ass't Editor
K. W. STILLMAN, Ass't Editor
ATHEL F. DENHAM, Field Editor
M. WARREN BAKER, Field Editor

Contents

Automotive Leaders Urge More Research in Advertising. By Lewis C. Dibble	73
Low-Priced Eight-Cylinder Model Added to Chandler Line	76
Details of Napier-Lion Airplane Engine Are Revealed	79
New Chrysler Laboratories Fitted With Ingenious Test Device. By A. F. Denham	82
Just Among Ourselves	85
Intricate Welding Operations Vital Part of Ford Production	86
Pageol Thinks Buses Will Replace Street Cars in 20 Years	90
Suggests Plant Depreciation Based on Changing Dollar Value. By K. W. Stillman	92
Manufacture of V-Belts Follows Cord Tire Practice	94
New Developments	96
U. S. and Canadian Exports	98
News of the Industry	100
Men of the Industry	104
Financial Notes	105
Calendar of Events	108
Advertisers' Index	110, 111

Automotive Industries is published every Saturday by
CHILTON CLASS JOURNAL COMPANY
Chestnut and 56th Streets, Philadelphia, Pa.

C. A. MUSSELMAN, President and General Manager
J. S. HILDRETH, Vice-Pres. and Director of Sales
W. I. RALPH, Vice-Pres. DAVID BEECROFT, Vice-Pres.
G. C. BUZBY, Vice-Pres.
A. H. VAUX
Secretary and Treasurer

JULIAN CHASE, Business Manager
Automotive Industries
Cable Address Autohand, Philadelphia
Telephone Sherwood 1424

GEO. D. ROBERTS
Advertising Manager

OFFICES

New York—239 West 39th St., Phone Pennsylvania 0080
Chicago—5 South Wabash Ave., Phone Central 7045
Detroit—710 Stephenson Bldg., Phone Northway 2090
Cleveland—540 Guardian Bldg., Phone Main 6860
Indianapolis—519 Merchants Bank Bldg., Phone Riley 3212
Los Angeles—433 Petroleum Securities Bldg., Phone Westmore 9084

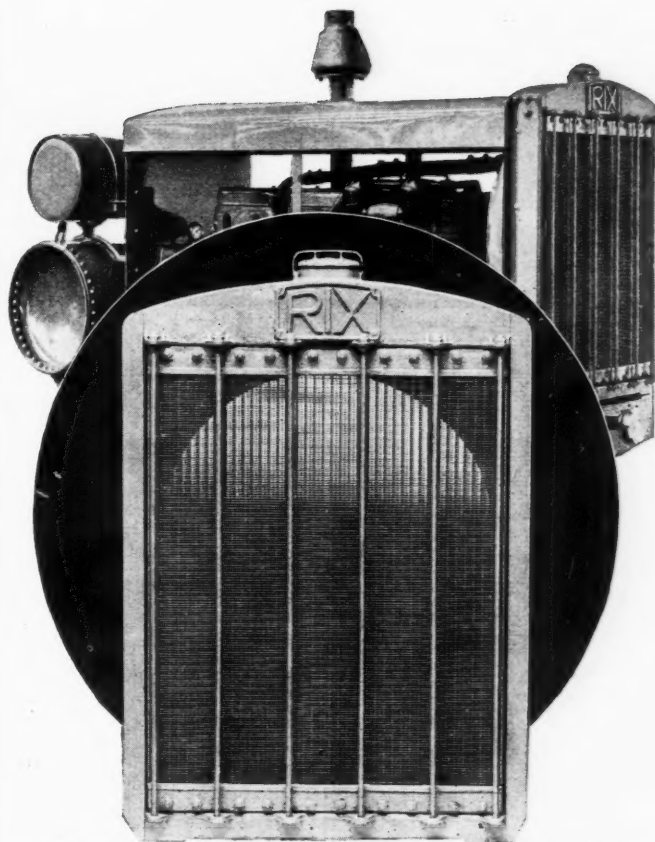
Owned by United Publishers Corporation, 239 West 39th Street, New York; ANDREW C. PEARSON, Chairman, Board of Directors; FRITZ J. FRANK, President, C. A. MUSSELMAN, Vice-President; F. C. STEVENS, Treasurer.

SUBSCRIPTION RATES: United States, Mexico and U. S. Possessions, \$3.00 per year; Canada, \$5.00 per year; All other Countries in Postal Union, \$6.00 per year; Single Copies, 35 cents.

COPYRIGHT 1928, CHILTON CLASS JOURNAL COMPANY

Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

Automotive Industries — The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.



Young Radiators for cooling engine on Rix and Thor Compressors, Rix Company, Inc., San Francisco — Independent Pneumatic Tool Company, Chicago

THE busy operator and the manufacturer that supplies the operator's equipment, are interested primarily in Results! That's what determines profits — or red figures. We understand this thoroughly — every man in the place does — that's why Young radiators are built better than industrial radiators were ever built before. Behind them is a wealth of experience in heavy duty construction, and every Young radiator is specially designed to cool perfectly and stand the gaff of the severest operating conditions.

Fine quality radiators for coaches, trucks, tractors, power units, and all types of cooling installations; backed by a guarantee of satisfaction

Young Radiators

YOUNG RADIATOR COMPANY

Racine

Wisconsin

Pacific Coast Representative

S. CLYDE KYLE

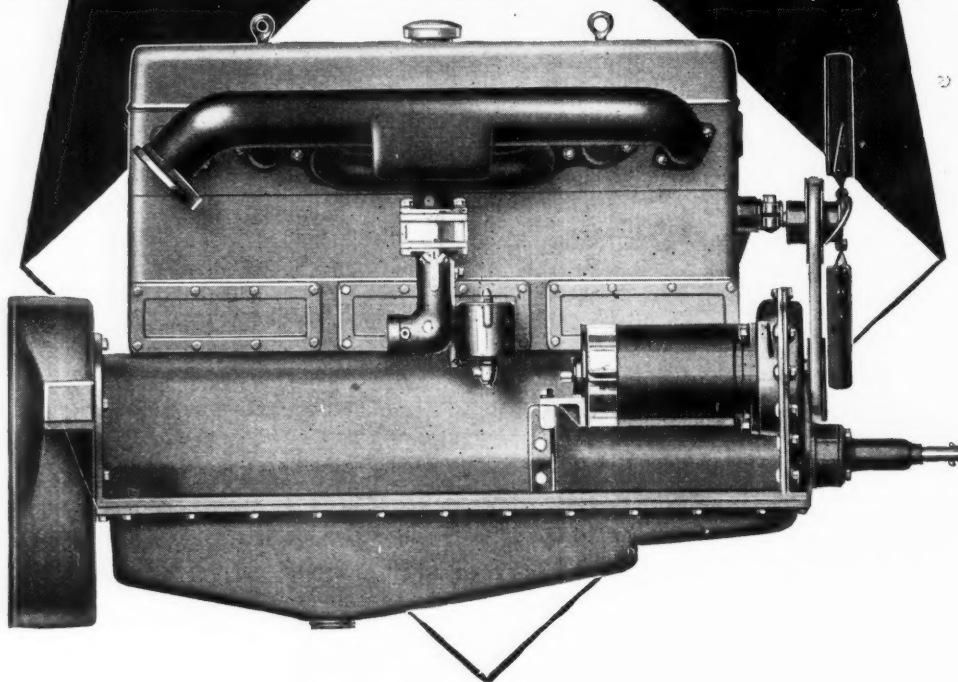
Rialto Building

San Francisco, Calif.



**MORE
POWER**

In Good Company



One good way to judge the real worth of Wisconsin Motors is to check over the manufacturers who use them.

You know several offhand. Not necessarily "big production" people—but they are leaders in quality, and any engine builder would be proud of them as customers.

The performance which Wisconsin Motors gives them is the chief thing we have to sell. "More Power per Cubic Inch" is part of the story. The rest is best told by a test motor installed for trial in your own job.

WISCONSIN MOTOR COMPANY
MILWAUKEE WISCONSIN

Wisconsin Motors are built in a full range of Sixes and Fours, from 20 to 150 H.P., for trucks, busses, tractors and construction machinery.

Wisconsin
CONSISTENT



AUTOMOTIVE INDUSTRIES

VOLUME 59

Philadelphia, Saturday, July 21, 1928

NUMBER 3

Automotive Leaders Urge *More* *Research* in Advertising

Job of selling getting bigger and demands same exacting methods as employed in production, declare speakers at 24th International Advertising Convention.

By Lewis C. Dibble

LEADING business men, including some of the outstanding executives in the automotive industry, gave those interested in the further development of progressive merchandising methods plenty of food for thought when they discussed the status of advertising at the twenty-fourth International Advertising Convention and Exposition in Detroit, July 6-12.

Business indicates that it is thoroughly sold on the value of advertising and admits it is one of the most valuable resources that it has ever had, but business questions whether or not advertising in its present form has reached its maximum efficiency. When one considers the vital part that advertising plays in modern merchandising and when it is further considered that business invests approximately \$1,500,000,000 annually in advertising, it is little wonder that the leading minds of the country should turn much thought and attention to ways and means of improving the efficiency and power of the art.

It must be said that much beneficial criticism to advertising developed at the Detroit convention. Men who have proved themselves big successes in commercial endeavor were not a bit backward in pointing out some of the faults they find with the way present advertising is conducted, and they likewise indicated that they believe what advertising needs is more thorough research, planning and thought.

What business believes should be done with advertising was tersely told by Alfred P. Sloan, Jr., President of General Motors Corp., who was also loud in his praises of what advertising has accomplished.

"Advertising men must find a more definite way of tabulating the results and increasing the efficiency of the present enormous advertising expenditures," was the language of Mr. Sloan, who further stated, "While a well known editor has said there is a waste in advertising of at least 50 per cent, advertising has reduced the cost of many articles, such as automobiles, as no other business force could."

"Approximately 12 per cent of our population is directly dependent upon the automobile, yet without mass production and national and even international distribution made possible by advertising, the industry would be far from what it is."

"It is as the greatest industry in the United States that the automobile must carry and is carrying the burden of national prosperity, and therefore it is our duty to make more efficient everything in that industry, including the force of advertising."

Another executive who offered much sound logic and presented the ideas an engineer would incorporate in advertising was C. F. Kettering, vice-president and director of research for General Motors Corp. Mr.

Kettering, like many merchandising specialists who spoke, strongly urged intense research as the greatest weapon for increasing the efficiency of advertising.

"Research as a factor in business today has assumed an entirely new place. In the old days we had hunches, we had inventors, and business was developed when and if a thing were made. Today we start out deliberately to develop and to do a perfectly definite thing to fulfill a perfectly definite need. The question of happenstance

New Model Announcements Next Week

CONTINUING the practice which has grown recently of making mid-summer announcements of new models, several more passenger car manufacturers will reveal details of their newest offerings next week. At least two new car descriptions are due for our issue of July 28, one of them covering extensive changes in one of the most important lines in the six-cylinder field.

in development today has been removed by the very simple process which may or may not be applicable to your line of work," Mr. Kettering said.

"Take the man who has been devoted entirely to research development. The only thing that impresses him as he looks at the advertising field is the ease with which the advertising thing is done. If we elect to build a piece of special apparatus to perform a function in a test, we may spend six months on the study of the particular thing and we may worry around about it with a half dozen men another year before we build and the cost of that apparatus might be \$15,000 or \$20,000, but the advertising men I have come in contact with write \$1,000,000 worth of copy while they are eating lunch.

Brain Density Thin

"In other words, the brain density on an advertisement to us looks relatively thin, and I believe that the copy in the papers, if thoroughly studied, would reveal something of that nature.

"The great reason for research and development is that of expanding human wants. We can supply the needs, and as we supply needs without increasing the wants the question of competition becomes more and more. Therefore, we feel from an engineering standpoint, that advertising is suffering chronic temporalism. It is for today only. We would like to see you begin to lay some extremely broad lines in your research, or lines in your advertising, that try to develop in addition to selling today's products what is going to be tomorrow's needs.

"There are two great factors to advertising which appeal to us, one is the very temporary thing of doing today's work and remembering to move today's goods, but the other thing is the broadening influence and the expanding of human wants, because as we perfect methods of supplying needs, the question of supplying work comes on the scene and can be fulfilled only by expanding wants.

"To whom do you advertise?" asked Mr. Kettering. "From the inside out you advertise to a various lot of people. The first ones you advertise to, or try to advertise to, are the people who do not have your product or your service, whatever that may be. You are trying to interest them. The next group of people that read your advertisements are the people that have the product, or the service. They either feel good, after they have read the extravagant claims you make, or they feel stung, and most users feel stung, after reading the advertisement, after they have the product. The next group of fellows that read your advertisement are your competitors, and don't lay down your whole future program to your competitors by advertising. A fourth group of people who read your advertising are the people who make your product, and the influence upon that group, as to what the company stands for, is important to the success of that concern.

Greek Advertisements

"If you were advertising to a bunch of people who would only read Greek you wouldn't write a French advertisement. But we have made a number of check tests entirely out of curiosity in which eight out of 10 people hadn't any idea of what the advertisement was about.

"That comes from too much culture in the advertising business. I don't believe you know what the average man understands. I think I mentioned a year or two ago at a meeting that in the investigating of certain clinics in connection with factory work, we found

that only 5 per cent of the workmen had ever had a tooth brush in their mouth. In checking that up we find that is quite common. So what is the use of talking about halitosis when a fellow doesn't know what a tooth brush is? If you are going to talk to a group of men who know all about that, that is sufficient. Consequently we have figured out—not accurately—that there are nine different languages spoken in the United States all under the name of English and there are nine different vocabularies that do not mean the same in the different terminology.

"One time we tried a test—this was a good many years ago and perhaps people have improved since then. The fellow wrote: 'This name is the hallmark of quality.'

"I said, 'What does the word hallmark mean?'

"He grabbed the desk to keep from falling over. He said, 'Everybody knows what hallmark means.'

"We took 15 people out of the office and there wasn't a single one of the 15 who knew. Two of them thought it must be a mark of quality.

"I made the statement the other day about a certain automobile advertisement where they had a polo visor that not over 10 per cent knew what polo was. This fellow said, 'It is perfectly ridiculous. Everyone knows polo.'

"We walked into the machine shop and we asked 15 men and not any of them knew what polo was. They knew it had to do with a horse and mallet and that was all.

"You men who live on golf courses and play the 19th hole perhaps at a higher score than any of the rest, just remember this, that only 5 per cent of the people in the United States have ever had a golf club in their hands and about 85 per cent of them wouldn't recognize a golf club if they saw it. Because you are familiar with a thing, don't think that the world is familiar with it. That doesn't follow at all.

Which is the Fool?

"We go to work and write the most beautiful instruction books on how to take care of a motor car. When you go to a country garage and see what the fellow does to it, you say he is a fool. Somebody is—we haven't found out quite which is yet, but somebody is.

"You people are going through as a new industry, although you are holding your twenty-fourth convention, exactly what the engineering world has gone through in every phase of engineering activity. That is, you have come along to where special men stand out as good, bad or indifferent; because of certain native ability they have been born engineers or born advertising men. That is part of every new industry.

"But finally you are up to the point where you are coming to the transition period of where you have to go from the natural-born guys to the measurement side. I will tell you why. There is more discussion today in management circles about the money spent in advertising than there has been since I was associated with the industry. That is a good sign that you ought to do something. We found that out in the engineering work. We used to do just like you people do. We used to call up and order things the day before we started production, just like you call up and want an O. K. over the telephone for an ad. I don't believe an ad would be any good if it was O. K'd over three days before it was to go to press.

"We know there are a lot of facts in the advertising business but it seems to me that one of the most constructive things that you could do would be to appropriate some certain amount of money and pick out some



Among the most interesting talks on advertising at the recent Detroit convention were those by C. F. Kettering (left), vice-president and director of research for General Motors, and Alfred P. Sloan, Jr., president

fellow who isn't too conventional and who doesn't believe the world is quite finished and let him start a research department for this advertising association," declared Mr. Kettering.

R. H. Grant, vice-president in charge of sales, Chevrolet Motor Car Co., gave an interesting talk in which he said that advertising ranked with engineering, manufacturing, money and sales as one of the five leading forces in modern business, but that it did not outrank any of the others.

Touching on the subject of appropriations, Mr. Grant said:

"I am not one of those men who believe that an advertising account should be bigger in hard times than it is in good times. I have had that talked to me by advertising solicitors and I think it is a fallacy that should be corrected in the advertising business.

"I don't believe, on the other hand, that we should go to the other extreme and every time we see a cloud on the horizon begin cutting the advertising account. I believe that advertising has, as a main function, the mellowing up of the market and getting a tremendous number of people half sold so that the salesman can go around later and pick them off.

"If we have a period of long depression the public makes up its mind to shut its pocketbook and all the advertising in the world and all the intensive sales campaigns won't be strong enough during that three or four months to make them open those pocketbooks. Therefore, my judgment of the situation, as an advertiser and a business man, is that we should modify always the amount we spend on this advertising force according to the effect that we can set up."

Another automotive executive on the program was C. W. Matheson, vice-president in charge of sales, De Soto Motor Corp. His paper on "Determining Markets" was read at a meeting of the Financial Advertisers' Association, held in conjunction with the convention.

Francis H. Sisson, vice-president, Guaranty Trust Co., New York City, was another prominent speaker to

stress the need for more thorough market analysis as a means of making it possible for advertising to help create new markets.

"America at present is undergoing a transition from a production era to an era of merchandising," said Mr. Sisson. "More than ever before, prosperity will depend upon ability to extend markets, develop new uses for products, and create more widespread consumer demand, rather than more ability to turn out large quantities of goods under mass production methods. The output of tremendous quantities of goods is now easily accomplished. Creating markets to assimilate such output is the future problem of business. Therein lies advertising's opportunity and its responsibility.

Expensive Production Capacity

"Industry in some lines has developed excessive production capacity for the time being. The capacity of steel plants in America is greater than the normal requirements. The automobile industry has an excess of capacity. Lumber and textile mills are equipped to produce more than present markets will assimilate, and similar excesses of capacity exist in some other industries. But the solution of this problem lies partly in obtaining better distribution of those products under discussion, and for that reason effective advertising that will further increase the consumption of goods will be more than ever in demand in future years. In building its production facilities up to such tremendous capacities, industry faces the necessity of aggressive development of markets. A greater economy in the distribution of American merchandise is needed. Economic mass distribution must keep pace with economic mass production. New uses must be discovered, new tastes stimulated to increase consumer demand.

"The future task of advertising is to extend markets still further through improved methods and technique, rather than by mere increases in advertising appropriations that will bring increases in sales only at the penalty of rising sales costs."

Still another interesting slant on the need for research in advertising was gained from the speech of E. St. Elmo Lewis, counsel in consumer and trade relations, Detroit. He took as his subject, "The Changing Job in the Advertising Department."

"All thoughtful men realize that we have entered a new era in advertising," said Mr. Lewis. "I need not say to this audience that the whole problem of distribution in the United States is 'unfinished business.' It is on the program of every business conference—it is the liveliest subject on the program of every trade association convention, and wherever two or more business men are gathered together this problem of marketing, sales advertising and merchandising plays a major part in the discussion.

"It would be absurd for this organization to ignore the present questioning attitude of American business and consumers toward advertising itself; it would be pathetic to admit that we had nothing of moment to contribute to the discussion.

"A new figure has stepped into the picture of present day advertising. He is the research man.

"W. S. James, research engineer at the head of the Studebaker Corp. of America, stated the question: 'Most of our industrial research has been confined to production. There is growing need of research in the sales and other departments so that they will not be outstripped by production.'

"That last phrase—'so that they will not be outstripped by production'—is the crux of the whole problem before American business."

Low-Priced *Eight-Cylinder* Model *Added* to Chandler Line

New 118-in. wheelbase car with piston displacement of 254 cu. in. will sell for \$1,295 to \$1,495. Small six is redesigned and cut in price from \$90 to \$200.

WITH its announcement of new models for the 1929 selling season, Chandler-Cleveland Motors Corp. enters the lowest-priced six and eight-cylinder fields, in addition to making improvements on the existing Big Six and Royal Eight series.

As the leader in low price, Chandler has the "65," a six developed from the former Special Six and selling within a \$875 to \$1,075 price range, corresponding body models being from \$90 to \$200 lower in price than last year, in spite of increased performance and improved appearance.

A considerable reduction in price, from \$70 to \$200, has also been made on the Royal Eight, which now sells from \$1,795 to \$2,195. Prices on the Big Six remain unchanged. Prices for the new eight range from \$1,295 to \$1,495. Following are prices for the complete line, with reductions:

Series 65	Re- duc- tion		Re- duc- tion
3-p. Coupe	\$ 875	\$180	
5-p. Sedan	895	100	
5-p. Touring	895	100	
2-4-p. Coupe	955	200	
5-p. De Luxe Sed.	995	160	
5-p. Sportster	995	90	
Cabriolet	1,075	140	
Royal 75			
			Re- duc- tion
2-door Sedan	\$1,295	New	
4-p. Coupe	1,295	New	
4-door Sedan	1,395	New	
5-p. De Luxe Sed.	1,495	New	
Big Six Series			
5-p. Met. Sedan	\$1,525	....
2-4-p. Coupe	1,725	....
4-p. Country Club			
Coupe	1,725	....
7-p. Touring	1,725	....
2-4-p. Cabriolet ..	1,825	....
7-p. Sedan	1,925	....
Berline Sedan	2,025	New	
Royal 85 Series			
5-p. Sedan	1,795	200	
4-p. Coupe	1,925	70	
3-p. Country Club			
Coupe	1,925	70	
De Luxe Sedan	1,995	200	
7-p. Touring	1,995	....
2-4-p. Cabriolet ..	2,095	....
7-p. Sedan	2,195	....
Berline Sedan	2,295	....

Performance has been bettered to a considerable extent on the Series 65. Primarily responsible for the increased power is an increase of $\frac{1}{8}$ in. in bore over the Special Six, this now being $3\frac{1}{8}$, with a piston displacement of 196 cu. in. and a rating of 23.4 taxable horsepower.

Contributing also is the new manifold, which is of higher speed design than formerly, and a new combustion chamber design which is remarkably effective in eliminating detonation, without reduction in compression ratio. This chamber extends roughly only to halfway over the piston, with a small clearance over the remainder, under the head, equal to the gasket thickness. Spark plug location is in the center of the chamber and slightly nearer the valves than the center of volume.

Changes have also been made in the crankshaft. With the adoption last year of a Lanchester torsional vibration damper it was found possible to leave off the

counterweights on the crankshaft and thus provide better accessibility in servicing the piston and rod assemblies. Incidentally, the manifolding also has been raised somewhat to make access to the valve lifters easier for adjustment of tappet clearance, etc. A rear outlet for the exhaust manifold supplements the center outlet of last year.

In the chassis also are found a number of important changes. Considerable attention has been given to the spring suspension, and the period of the springs changed to give better riding comfort. Tryon spring shackles, of the self-adjusting type and incorporating tapered pins, are now used. These shackles contain oil reservoirs which reduce the number of lubrications required annually.

Vacuum Brakes Extra

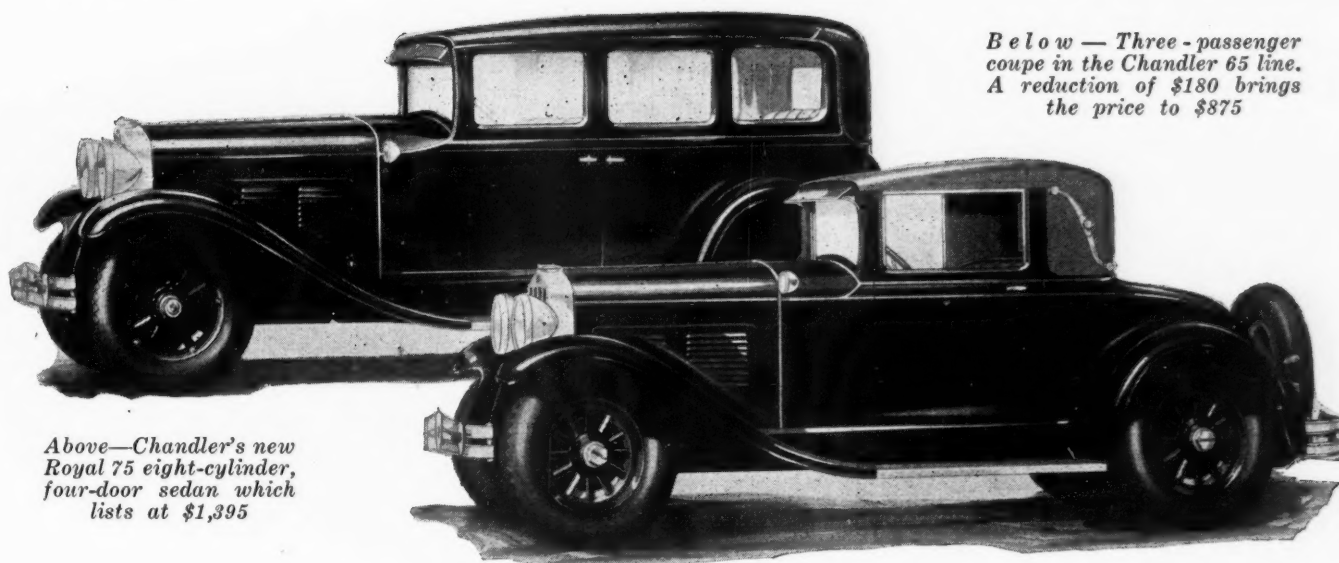
Some modification has also been made in the brake-linkage to give a lighter pedal pressure. Westinghouse vacuum brakes are available on this model at \$75 additional cost. One-shot lubrication systems can also be had at \$60 additional.

To provide a more rigid front end construction and eliminate "front end weave," the front cross-member under the radiator of the 65, which was of inverted U shape, has been provided with an additional plate, making the member box-shaped. A straight ratio Ross cam and lever steering gear has also been adopted for easier steering.

In the bodies of the 65 are found numerous changes contributing to improved appearance. Radiator, hood and cowl assembly have been raised to give the cars a more massive appearance. Fenders are more sweeping and the running board has been shortened to give an appearance of greater length. Viewed from the front, the radiator height, which is larger than formerly, is further accentuated by a false bottom, while a new flush type radiator filler cap, with a central ridge blending into the hood hinge, contributes to greater neatness. Horizontal lines are further accentuated by the adoption of horizontal louvres.

Chrome-Plated Hardware

All exterior hardware, including headlamps, cowl lamps and bands, door handles, etc., are chrome-plated. A new radiator emblem in vivid black, red and gold provides a distinctive touch. On the interior is found a new decorative instrument panel, mounting in addition to the usual instruments a dash gasoline gage and engine thermometer. Standard equipment also includes rear view mirror, automatic windshield wiper, electro-lock on dash, twin filament headlight bulbs, with light



Above—Chandler's new
Royal 75 eight-cylinder,
four-door sedan which
lists at \$1,395

Below — Three-passenger
coupe in the Chandler 65 line.
A reduction of \$180 brings
the price to \$875

control on steering wheel, a built-in foot rest, and a robe rail.

In addition the de luxe sedan is also fitted with smoking sets, pockets in the doors, circassian finish instrument board and garnish moldings, and insignia on the latter. It is upholstered in unpleated mohair. All models are available in four optional color schemes. A special price of \$50 extra provides bumpers, bumperettes, Lovejoy shock absorbers, and combination tail and stop light as additional equipment. Six wire wheels and fender wells are also available.

Attractive body lines are immediately apparent on the Royal 75, the new low-priced 118-in. wheelbase eight, but the outstanding feature of this model is its high performance. Built not to deliver unusually high top speeds, but to provide the best possible hill-climbing ability, getaway, and acceleration consistent with a maximum speed of 65 m.p.h., the eight-cylinder engine is said to develop 75 hp. at around 3200 r.p.m. It has a bore and stroke of 3 by 4½ in., giving it a piston displacement of 254.4 cu. in., and a rating of 28.8 hp. Its five bearing 2½ in. crankshaft is fully counter-weighted, and its main bearing lengths are 1¾ in. for the front, 1½ in. for the intermediates, and 2½ in. for the rear. Crankpins are 2¼ in. in diameter and have bearing lengths of 1¼ in.

Main Bearing Construction

An interesting departure in the main bearing construction is found in the type of bearing caps used. These are of steel and the babbitt shell is assembled to it under pressure, the cap first being tinned and heated similar to the Chandler method for connecting rods. With the continuation of the Chandler method of using a babbitt shell for the upper bearing half, setting directly in the crankcase, bronze for main or rod bearings is eliminated.

Connecting rods are 9½ in. between centers, and piston pins are locked in the rod, these being 7/8 in. in diameter. To make the bolt more accessible with the small bore piston, it is set in at an angle in the rod. Pistons are of cast iron and have an overall length of 3¾ in. They are fitted with three rings, the lower ring being of the oil control type, and the upper two 1/8 in. wide.

Exhaust valves are of Silchrome steel, and inlet of carbon nickel steel. Five bearings also support the camshaft, which is driven by a Morse chain. Combustion

chamber design is quite similar to that used in the 65 series. In the lubrication system another innovation is found. The oil pump is unusually large so as to keep the oil pressure relief valve discharging continuously, this portion of the oil being directed onto the chain in the front end housing. Main connecting rod and camshaft bearings are lubricated under pressure. Oil pump drive is by an inclined shaft from bevel gears on the camshaft.

Compression Ratio 5.0 to 1

Fan and water pump are integrally driven by a V-type fan belt. In the cooling system is also included a thermostat built into the cylinder head water outlet. Fuel system is of the vacuum type, using a Tillotson carburetor. Fins are provided on top of the high-speed intake manifold to cool the vaporized gas and obtain higher volumetric efficiency. Compression ratio is 5.0 to 1. A 16-gallon tank is provided and a fuel economy of 17½ miles per gallon is claimed.

Electrical units are all of Autolite manufacture. Distributor drive is off the generator driveshaft, the latter being driven by the timing chain, for which it furnishes an adjustment. Starter engagement is by Bendix drive. The ignition coil is attached to a bracket at the front of the cylinder block.

In unit with the engine are the single-plate, 9-in. Borg & Beck clutch and three-speed transmission of Chandler manufacture, the latter being of similar design to the gearset in the Series 65. Universal joints and propeller shaft are of Spicer manufacture. Rear axles are a Chandler product and of semi-floating design, using Timken taper roller bearings throughout. Timken bearings are also used in the front axle wheel bearings. Rear axle standard reduction is 4.9 to 1, with a ratio of 4.5 to 1 available if higher road-speeds are desired. Hotchkiss drive is used. Tires are 29 by 5.50 mounted on 19 in. wood spoke wheels, the spokes being of elliptical section to give a more massive appearance while retaining lightness.

One shot Bowen chassis lubrication is standard on this model as well as the higher priced lines. The same is true of the Westinghouse air booster for the four-wheel external brakes. Shipping weight of the sedan is 3450 lb., weight ready for the road being given as 3600 lb.

A high, narrow radiator, cowl and hood, the latter with three sets of horizontal louvres, give an impres-

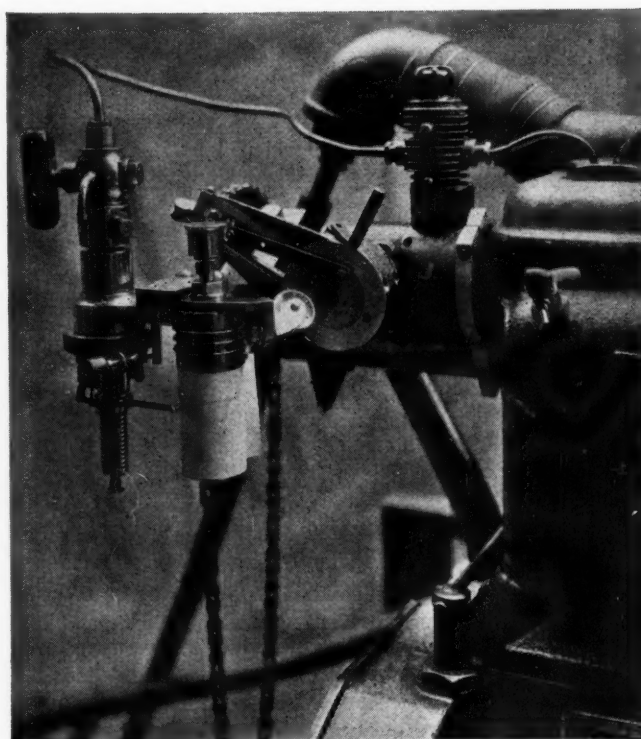
sion of power to the front end. Other body characteristics are its low roof line, long, sweeping fenders, new type of cadet sun-visor, short running board and effective molding treatment. To dress up the rear of the car, spring horns are covered by metal plates. All exterior hardware on this model also is chrome-plated. This includes the hood center hinge. Standard equipment is similar to that of the 65, although not definitely announced at time of going to press.

Changes in the Bix Six are largely confined to body refinements, although a Ross straight ratio steering gear has been adopted for this model also. Body changes include such features as an attractive new instrument board, 12-spoke wood wheels, felt padding under the rubber floor mat in the driver's compartment for better noise and heat insulation, new hub caps with the new Chandler emblem reproduced on them in color, and the adoption of cadet type sun visors. Fenders are also new in shape and on the front tip of the front fenders the Chandler emblem is again found in colors, stamped and blended into the fenders and enameled.

The same changes are found on the Royal 85, the larger straight eight. Both 85 and 75 are also available in four optional color schemes, similarly to the smaller models. Broadcloth upholstery is also optional on all de luxe models of the Chandler line except on the 65 series.

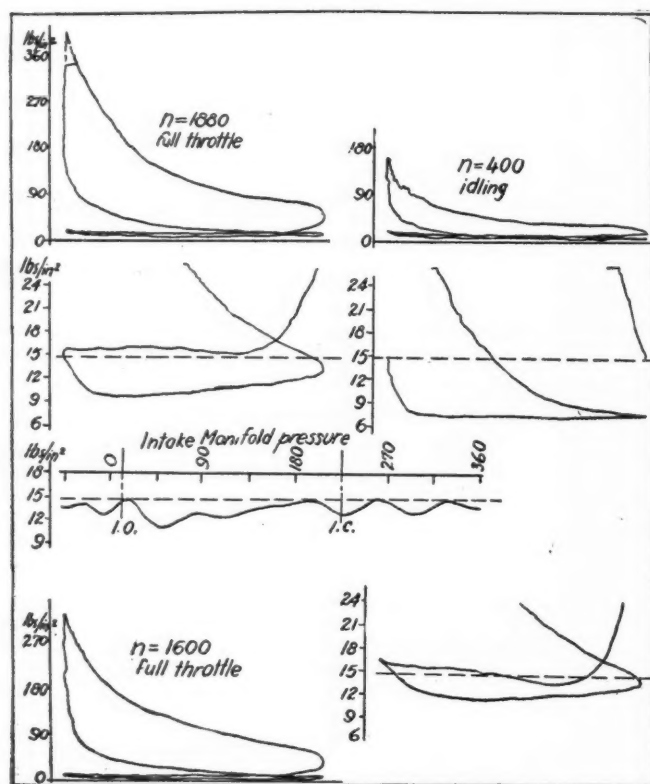
High Speed Indicator

THE accompanying photograph shows the latest form of the De Juhasz high speed indicator, in which use is made of a valve that opens the passage between the engine cylinder and the indicator cylinder at a certain point of each cycle, means being provided for changing the timing of the valve continuously so as to pass through the whole cycle. The inventor, K. J. de Juhasz, is connected with the Department of



De Juhasz high speed engine indicator mounted on a Willys-Knight engine in the engineering laboratory of the University of Minnesota

Research of Pennsylvania State College, but the cards reproduced herewith were obtained in the engineering laboratory of the University of Minnesota. We understand that the indicator has been used successfully for indicating a racing engine running at 6000 r.p.m. In fact, the speed of motion of the indicator parts depends upon the rapidity with which the valve mechanism is put through its cycle and not on the engine speed, hence inertia is not the factor that it is with the ordinary indicator in which the moving parts follow the change in pressure in the engine cylinder during each cycle.



Cards taken with De Juhasz high speed indicator on a Packard engine (1237) and a Willys-Knight Model 65 engine

THE technical program of the World Engineering Congress which is to be held in Tokyo, Japan, during October 1929, has been issued. The program covers practically the whole range of engineering activities and under automotive engineering, one of the 23 major divisions, it lists chassis, bodies, automotive engines, motor car equipment, etc. Under aeronautical engineering are listed aerodynamics, airplanes, dirigibles, air propellers, equipment, instruments, etc. Other subjects related to automotive engineering that will be discussed are fuel and combustion engineering.

Papers for the Congress are solicited. They should not exceed 8000 words in length, should be typewritten on one side of the paper with double spacing, and should be mailed in duplicate to the Secretary, World Engineering Congress, Nihon Kogyo Club, Marunouchi, Tokyo, Japan, not later than April 1, 1929.

AS a result of the recent death of Signor Fornaca, chief engineer and one of the two general managers of the Fiat Works (the other being Senator Agnelli), the management of the big Italian firm has been reorganized. In future Senator Agnelli will be the sole representative of the stockholders, and he will be assisted by Prof. Valetta as general works manager.

Details of Napier-Lion Airplane Engine are Revealed

British Admiralty lifts ban on facts relating to design of power-plant which won Schneider Cup race and enabled Captain Campbell to set new automobile record

THERE has been considerable curiosity regarding the details of design of the Napier Lion Series VII-B engine with which the Schneider cup was won at Venice last year, and which was used in the racing car of Capt. Malcolm Campbell, when that driver set a world's automobile speed record at Daytona Beach last winter, especially because the British Admiralty had prohibited publication of descriptive details. This ban on publicity has now been lifted and we reproduce herewith from *Engineering* of London a sectional view of the engine and the following particulars of its design, which were contributed to our contemporary by Capt. G. S. Wilkinson, chief engineer of the firm of D. Napier & Sons, builders of the engine.

The engine is of the general type which has been built by the Napier firm since shortly after the war, having 12 cylinders arranged in three rows, giving what is known as a W engine. The overall dimensions of the Series VII-B engine are:—Height 2 ft. 10½ in., width 3 ft. 2½ in., and length 5 ft. 6¼ in.; these figures give a reduction of 1½ in. in height, 3½ in. in width, and an increase in length of 8¼ in., over the standard Series V engine. The reduction in the width and height is due both to the fact that the accessories have been mounted in such positions that they are masked by the engine, and that the cylinders have been reduced in overall length and slightly sunk into the crankcase. The increase in length is the result of the carburetors being moved to the rear of the engine, and the propeller shaft being coaxial with the crankshaft. The total weight of the engine, when dry, has been reduced from 940 lb. to 930 lb., which, as the maximum horse-power developed by the racing engine is 875, gives the remarkable figure of 1.063 lb. per horse-power.

Engine Speed Increased

The increased output of the engine has been arrived at principally by raising the revolutions per minute from 2000 to 3300, and by increasing the compression ratio to 10.0 to 1. The combined effects of the increase in engine speed and compression ratio threw a considerable extra strain on the ignition system, particularly the spark plugs, the high gas temperatures and pressures necessitating exceptionally good jointing between the various components of the plugs, and small surfaces exposed to the gas. To avoid deposits, and the consequent electrical leakage over the small insulating surfaces, special care had to be taken in the cylinder design as well as in the fuel used, and, to prevent undesirable bulges on the cylinder block cowls, a special type of plug was made, having a very short body with a cable terminal designed to reduce the length of the projecting part of the electrode.

Lengthy experiments were carried out to discover

the most suitable fuel to insure sweet running, the final choice being spirit containing 75 per cent petrol and 25 per cent benzole, to which mixture tetra-ethyl lead dope was added in the proportion of 13 cc. per gallon; the total consumption of this fuel is approximately 50 gallons per hour.

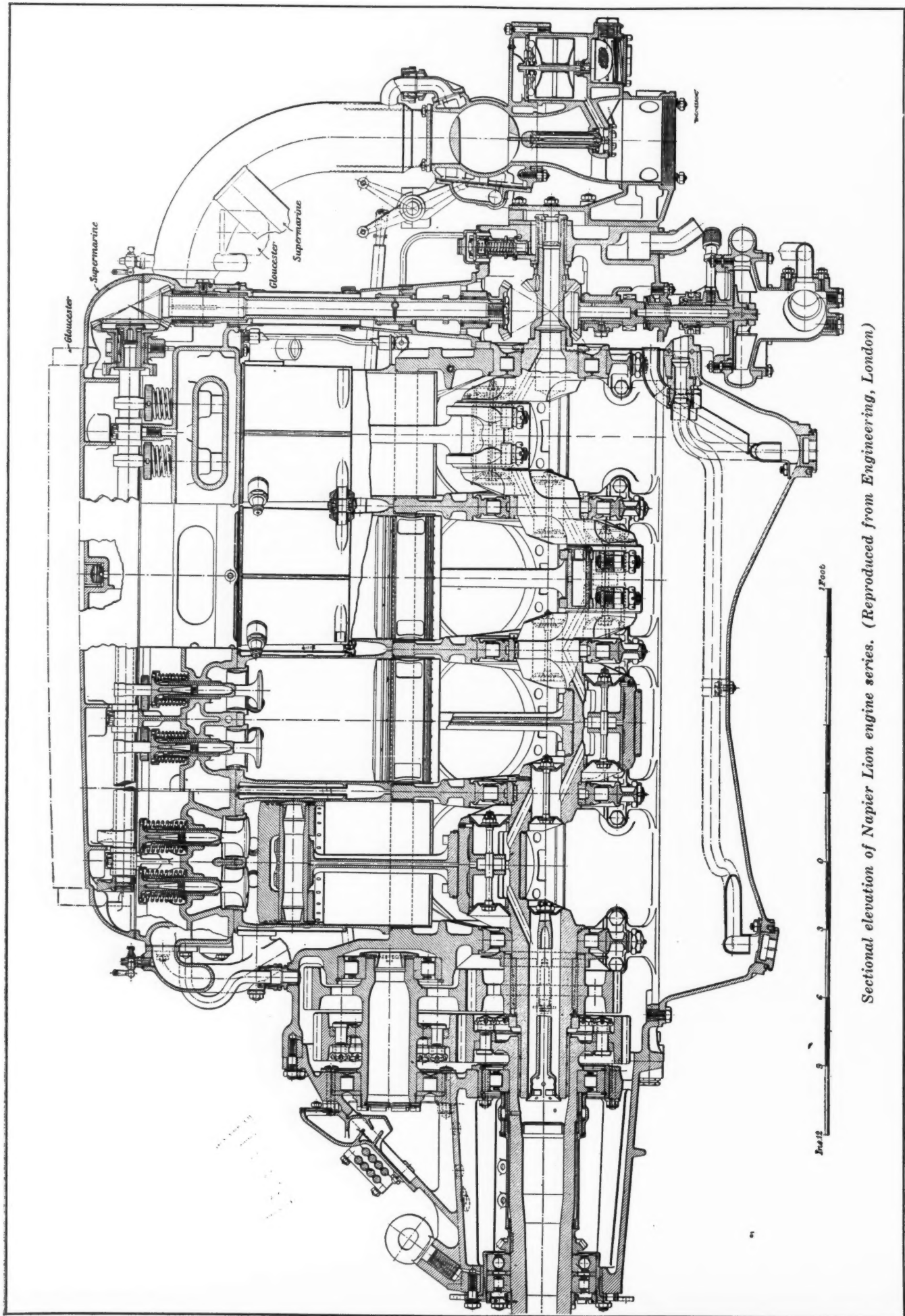
As might have been expected, on account of the considerable increase in the engine speed, radical changes were necessary in piston design in order to reduce the weight of the reciprocating parts. The pistons are of forged Y alloy instead of aluminum alloy castings. The bearing surface taking the lateral thrust due to the obliquity of the connecting rod has been cut down to the lowest possible limit, being only sufficient to cover the piston bosses. Another change from the standard engine is that both ends of the piston pins are blanked off by domed plugs and the pin is allowed to float in its bearings. A second oil scraper ring has been added below the piston bosses, which, in conjunction with a large number of drain holes through the piston walls, was found necessary to cope with the extra amount of oil splashed onto the cylinder walls.

Connecting Rods Shortened

The only change in the connecting rod assembly is that all rods have been shortened. Two modifications in crankshaft design are worth noting. The forward end has been extended and slightly changed to accommodate a two-step reduction gear and the plain floating bearing of the propeller shaft, and a thin metal plug or cylinder has been inserted inside the hollow crankpins. This cylinder also acts as a dirt collector. The oil on its passage through the hollow crankpins first enters the outer chamber of the hollow cylinder, where any impurities tend to collect on the outer wall, due to centrifugal force, the purer oil flowing on into the center chamber.

A single hole is cut through the wall of this center chamber, coinciding with a hole through the crankpin and in direct alignment with the oil ducts of the connecting-rods, through which oil is fed to the piston-pin bearings. By this means only an intermittent supply, one pulse per revolution, is allowed to reach the piston-pin bearings, thereby materially reducing the possibility of an excess of oil reaching the combustion space. There is very little change in the design of the crankshaft main bearings, except that the steel caps, which form the lower half of the housing, have two lugs forged on each end, which are bolted to the sides of the crankcase. These caps thus perform the duties of tie-rods, adding generally to the rigidity of the engine frame, and relieving the oil sump, which is made of a very light magnesium alloy.

Possibly the most striking feature of the whole engine is the double-reduction gearing. As shown in



the sectional view, it is of the double-reduction type, and it gives a reduction ratio of 1 to 0.765.

With the object of keeping all the auxiliaries within the ideal fuselage, the magnetos have been moved to the front end of the engine, and mounted nearly parallel to the crankshaft in such a manner that they come inside the fairings of the side cylinder blocks. The necessary drive being obtained through a bevel wheel mounted on the propeller shaft, just behind the front duplex bearing. The forward thrust of the propeller is taken from a shoulder machine on the propeller shaft near the rear end, and is passed forward via the inner race of the rear single roller bearing, the propeller shaft guard, and the bevel gear wheel for the magneto drive to the front double bearing, whence it is finally transmitted to the engine frame by means of a collar held by a ring of studs.

Turning now to the rear end of the engine, a single bevel wheel is keyed on to the auxiliary driveshaft, the rear end of which runs in a plain white metal bearing and is blanked off by a hollow plug, through which is fed the main oil supply to the crankshaft. As regards the camshafts and valve gear, both the lift of the valves and the diameter of the ports have been increased, the inlet valves being made of a nickel-chrome steel and the exhaust valves of a special heat and erosion-resisting steel.

The arrangement of the carburetors and induction pipes has been greatly modified. Three special Napier-Claudel-Hobson carburetors, one for each block of cylinders, are fitted, instead of the standard arrangement of two, in which the port carburetor is of the duplex type, supplying both the center and wing blocks. The overall height has been lowered, and the cross-sectional area of the throat has been increased to give the extra power. It should be also noted that the induction pipes are carefully hidden behind the cylinder blocks, and that the induction manifolds have been sunk into the headers.

Water System Changed

Drastic changes had also to be made in the system of water circulation. Normally, a water system is arranged so that the water is flowing in a natural direction, and will circulate by thermo-syphon at low engine speed. In the racing engine, where the space between the cylinder blocks had to be kept clear, the outlet pipes had to be taken down the front end of the blocks and led back along the bottom of the vees, the connection to the radiator being at the rear end. The outlet pipes at the front end of the headers were designed to avoid trouble from air locks. As before, hot water is tapped from the outlet pipes and is passed through the carburetor and induction pipe jackets, returning directly to the pump. This arrangement of cooling-water circulation was fitted to an ordinary standard Lion engine, and tests were made with the engine inclined both upward and downward at an angle of 25 deg. In this way it was proved that the system would operate satisfactorily for the conditions of the race.

Lubricating oil is fed to the engine through two main supplies, the direct connection through the oil sump to the front end of the crankshaft having been dispensed with. The first supply, as before, enters the rear end of the crankshaft via the auxiliary driveshaft and the hollow plug previously mentioned. At the front end of the crankshaft the oil emerges into a conical space inside the airscrew-shaft, which is plugged by a light steel cap. Holes are cut through the propeller shaft through which oil is fed to a banjo bearing on the outside of the propeller shaft guard

tube, whence a supply is taken to two jets, which direct it on to the reduction gearing just before the point of contact. The remainder of the oil works its way along the annular space between the propeller shaft and the guard tube, and lubricates the magneto drive and the front end bearings. The second supply is fed to the camshafts and valves in a similar manner to that employed in the standard engine, the overflow at the front end of the headers being directed on to the reduction-gear pinions, and, at the rear end, flowing down inside the guard tubes of the camshafts driveshafts, and lubricating the bevel gearing.

Chemistry of Motor Fuels

THE chemistry of motor fuels and their behavior in the engine cylinders in practical operation are the principal subjects of a book recently issued by the Berlin technical publishing house of Richard Carl Schmidt & Co. (*Kraftstoffe, Verbrennung und Schweroel-Vergaser Motoren*, by A. E. Thieman). The author, who is an engineer, says the book represents an attempt to form a mental picture of the chemical structure and the physical properties of motor fuels and of the phenomena of combustion which enables engines to generate mechanical power. It has become a matter of course for mechanical engineers to familiarize themselves with the properties of the materials of construction employed by them, and automotive engineers should equally familiarize themselves with the properties of the fuels which are being used in their engines, and with the chemical reactions which take place in the engine cylinder.

Starting with an explanation of the very fundamentals of physical science, the structure of the atom, the author leads his readers through the chemistry of the elements which chiefly compose motor fuels and then passes on to the chemical compounds of which these fuels are composed. Then follow chapters on the behavior of the hydrocarbons at high pressures and temperatures, origin and preparation of motor fuels, physical properties of liquid fuels, combustion, the explosive wave, behavior of fuels in the engine, detonating combustion, spectro-analysis of cylinder flames and anti-detonants.

The treatment is partly in the form of a review of experimental work done on motor fuels and experience in practice with such fuels throughout the world, as made public in periodical literature and in papers presented before scientific and professional organizations, and partly critical and philosophical. The author says in this connection that he does not put forth his opinions and conclusions as infallible, but suggests that they be regarded with skepticism, and he invites the same criticism that he metes out in his book to others with whose opinions he disagrees.

The last part of the book deals with the carburetor type of heavy oil engine and contains descriptions and illustrations of heavy fuel carburetors, most of which are well known.

WE are in receipt of two pamphlets in Italian by Dr.-Eng. Umberto Re of Milan, Italy, one being entitled *Le Miscele Carburanti e L'Automobilismo* (The Fuel Mixture and Automobiling) and the other, *Il Controllo della Carburazione nel Motore a Scoppio d'Automobili* (The Control of Carburetion in Automobile Heat Engines). Both are reprinted from the Italian technical periodical *Il Monitore Tecnico*.

New Chrysler Laboratories Fitted With Ingenious Test Devices

Recently opened Engineering Building at Highland Park plant divided into metallurgical, physical, electrical and mechanical sections. Equipment of novel design.

By A. F. Denham

IN the new Engineering Building of the Chrysler Corp., at its Highland Park Plant, is to be found the most complete and modern experimental testing equipment available. Although divided into four main sections, metallurgical, physical, electrical and mechanical, the layout of the equipment and methods of conducting tests are such as to provide the close interrelation of data required by developmental work of any nature on automobile parts.

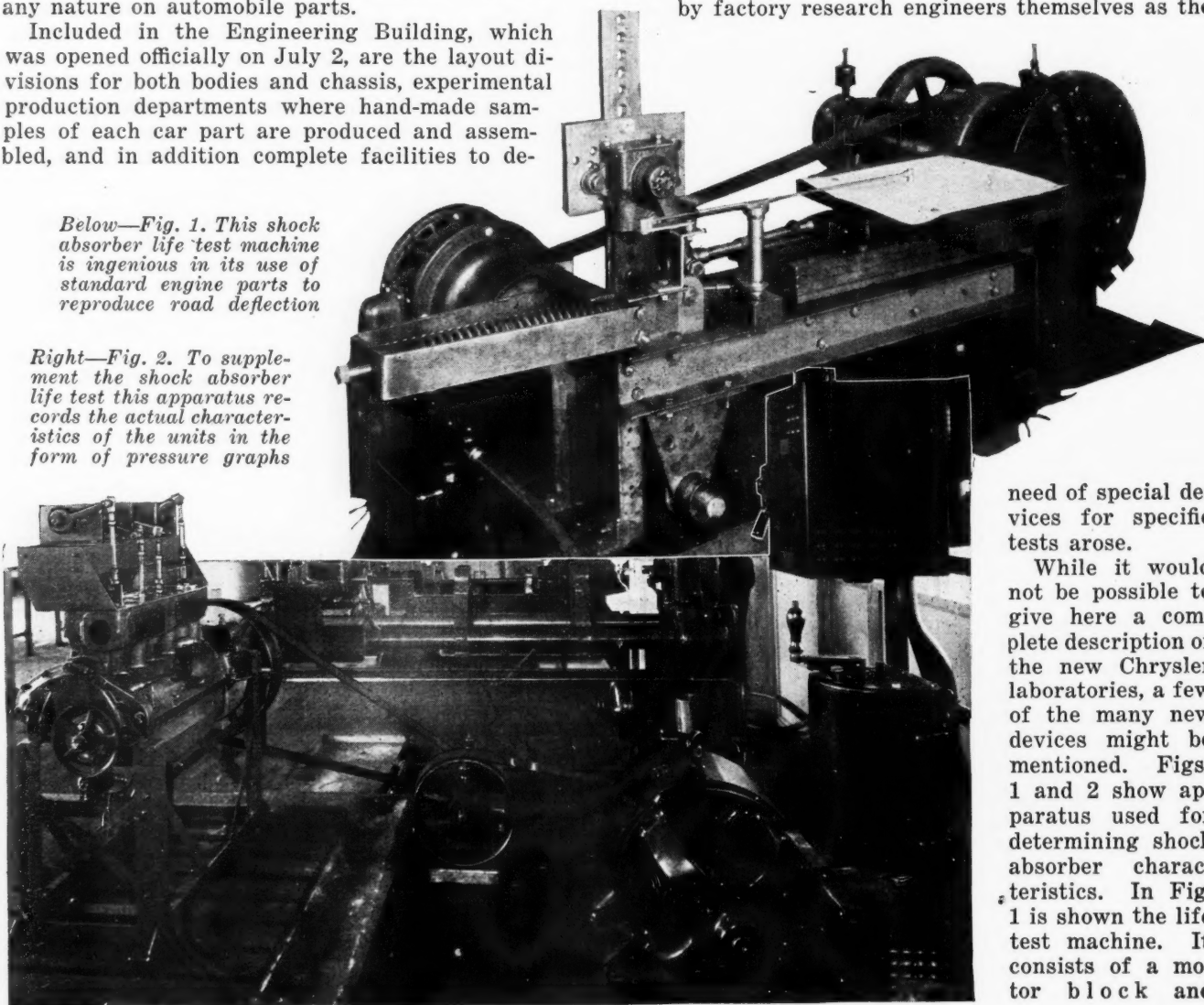
Included in the Engineering Building, which was opened officially on July 2, are the layout divisions for both bodies and chassis, experimental production departments where hand-made samples of each car part are produced and assembled, and in addition complete facilities to de-

termine the characteristics of the various car parts on the final product itself.

Naturally many ingenious devices have been developed for specific testing of parts for which no standard methods of testing have as yet been evolved. As pointed out in an article on laboratory instrumentation in the Engineering Issue of *Automotive Industries* (June 23, 1928), such devices have had to be developed by factory research engineers themselves as the

Below—Fig. 1. This shock absorber life test machine is ingenious in its use of standard engine parts to reproduce road deflection

Right—Fig. 2. To supplement the shock absorber life test this apparatus records the actual characteristics of the units in the form of pressure graphs



need of special devices for specific tests arose.

While it would not be possible to give here a complete description of the new Chrysler laboratories, a few of the many new devices might be mentioned. Figs. 1 and 2 show apparatus used for determining shock absorber characteristics. In Fig. 1 is shown the life test machine. It consists of a motor block and

Fig. 3. One of the most modern life testing machines is this used at the Chrysler laboratories for determining spring life. It is adjustable to simulate all load and road conditions

crankcase, equipped with crankshaft, connecting rods and pistons, to the heads of which are attached link rods connected to the shock absorber arms. A belt pulley wheel is mounted on the rear end of the crankshaft in place of the flywheel, through which the assembly is driven at any desired speed. At the front of the crankshaft is shown the special gear used to drive the oil pump for crankshaft lubrication.

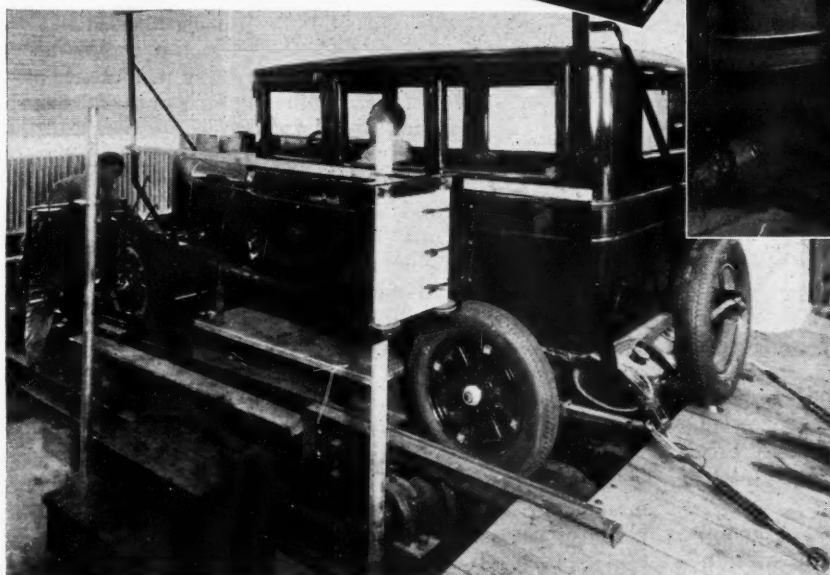


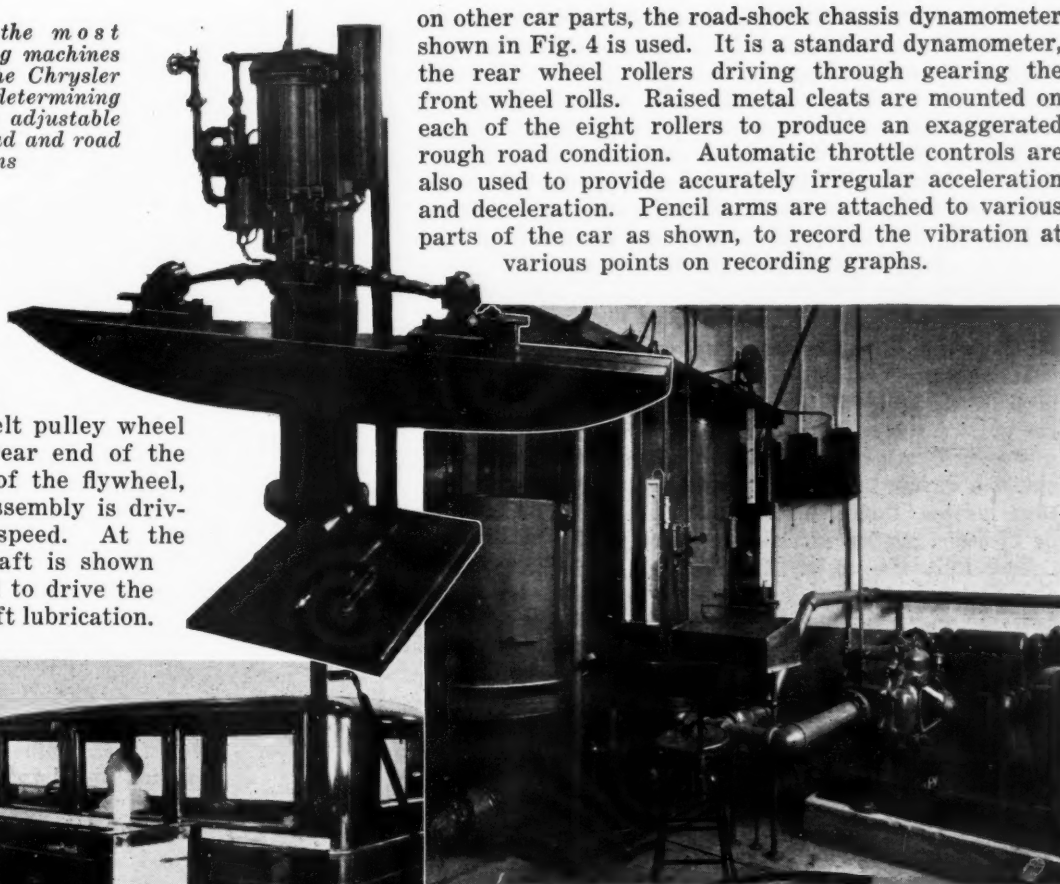
Fig. 2 shows the method of determining the characteristics of the shock absorbers at all points of their cycle, as well as at different speeds. The road deflection is reproduced mechanically by an eccentric belt driven from an electric motor as shown, this eccentric being adjustable so as to enable studies for different amounts of deflection. The unit itself is mounted on an adjustable arm pivoted below the bed of the mounting table. The arm is spring-controlled, and the eccentric produces a movement of the unit corresponding inversely to the amount of back pressure developed in the shock absorber. This movement is recorded on a chart in the manner shown.

Testing Riding Qualities

The determination of riding qualities is considered an especially important item. Fig. 3 shows a spring life test. The springs are mounted in the same types of shackles used on the car for which they are designed. Preloading is applied by the worm and gear mechanism shown at the bottom of the instrument, and spring deflections are obtained by a hydraulically-operated plunger, lending itself well to the reproduction of motion in connection with the use of shock absorbers.

As a final test of riding qualities, and also as a check

on other car parts, the road-shock chassis dynamometer shown in Fig. 4 is used. It is a standard dynamometer, the rear wheel rollers driving through gearing the front wheel rolls. Raised metal cleats are mounted on each of the eight rollers to produce an exaggerated rough road condition. Automatic throttle controls are also used to provide accurately irregular acceleration and deceleration. Pencil arms are attached to various parts of the car as shown, to record the vibration at various points on recording graphs.



Above—Fig. 5. The apparatus shown here is used by Chrysler engineers for determining air flow and metering characteristics of such parts as carburetors and manifolds

Left—Fig. 4. This view shows a car being checked after submitting it to a test on the road-shock dynamometer. This test is highly valuable for determining the proper points for chassis and body braces to obtain maximum rigidity with flexibility

Fig. 5 shows the apparatus used for flow-testing of carburetors, manifolds, etc. These are mounted under the bell shown at the left, which is provided with a water seal. The rear tank is used for balancing to maintain atmospheric pressure under the test bell during a test. Immediately to the right of the bell tank are shown the calibrated manometers for measuring the pressure drop across the sections being investigated. The amount of air is obtained from the scale attached to the balancing tank, while the amount of fuel is measured by the Marvel flowmeter shown immediately above the desk. The pumping equipment at the right is for the test vacuum.

Among the many other devices might be mentioned the exposure to sunlight conditions, reproduced by a Cooper-Hewitt lamp, of upholstery materials to determine fading characteristics, and lacquered plates to determine the life of the lacquer. With the latter the plates pass through a water tank once every 30 minutes to exaggerate the weathering effect. Outdoor tests supplement both of these investigations.

An interesting feature of the cold room is the use of radio loud speakers for communication with the outside, always a difficult problem since most of the recording is carried on outside the cold room during a test.

In making starter life tests, the recorder to register the number of engine starts is direct connected to the generator on the motor, thus insuring that each recorded start is an actual start. The control for the Bendix switch is also obtained through the generator, by means of low energy electro magnet.

On dynamometer engine tests, calibrated flow meters are used throughout to eliminate the necessity of taking fuel consumption readings by weighing. These flow-meters are adjustable for various carburetor and engine sizes by means of jets in the outlet, and give a quick indication of best carburetor setting for either maximum power or best economy at any speed or load.

In the rear axle life test equipment a governor is used to provide continuous acceleration and deceleration, the governor arm being connected to the engine throttle, a standard engine, clutch, transmission and propeller shaft hook-up being used, as an additional check on these units. Rear axle load is taken at the wheel hubs by electric generators.

The influence of the aircraft engine laboratory is also shown in many devices used to test car parts. For radiator and fan tests, for instance, wind tunnels equipped with pitot tubes are used for measuring air velocity. Pitot tubes are also used in one or two instances for measuring water flow, especially in engine circulation tests. Pitot tubes of course consist of two tubes with calibrated orifices, so directed as to measure the static and kinetic pressures in any system in which circulation is present. They offer a minimum of restriction to the liquid or air flow.

Stutz Introducing Three New Convertible Bodies

THREE new types of convertible bodies on the 145-in. wheelbase chassis shortly will be on display by Stutz dealers. The bodies are by Philips and consist of a five-passenger sedan, a seven-passenger and a five-passenger limousine.

Tops are quickly collapsible, and in the limousine type the limousine glass may be used as a tonneau windshield if passengers so desire. Door windows, of course, may be raised for side wings when the top is down.

The top material is light weight but substantial and

sporty and folds compactly to a position parallel with the ground level. Construction is somewhat similar to that of the conventional speedster, with wood bows and metal slat irons. The irons are of monel metal, making them impervious to rust in all climates.

The five-passenger sedans are upholstered either with hand-crushed leather or Bedford cord fabric. All five and seven-passenger limousine bodies are upholstered in the front compartment with leather available in a variety of shades to harmonize with the color plan of the exterior. Tufted fabric is used for the trim while the leather upholstery is of the custom flat mode with a single welt in the center of both seat and back cushions.

Arm Rests in Rear

Leather trimmed bodies have a leather robe rail while those with fabric trim have a silk robe rail. All bodies are equipped with arm rests in the rear compartment. A courtesy light is embedded in the back of the front seat and operated by automatic switch in the right rear door, and at either side of the light ample pockets are provided.

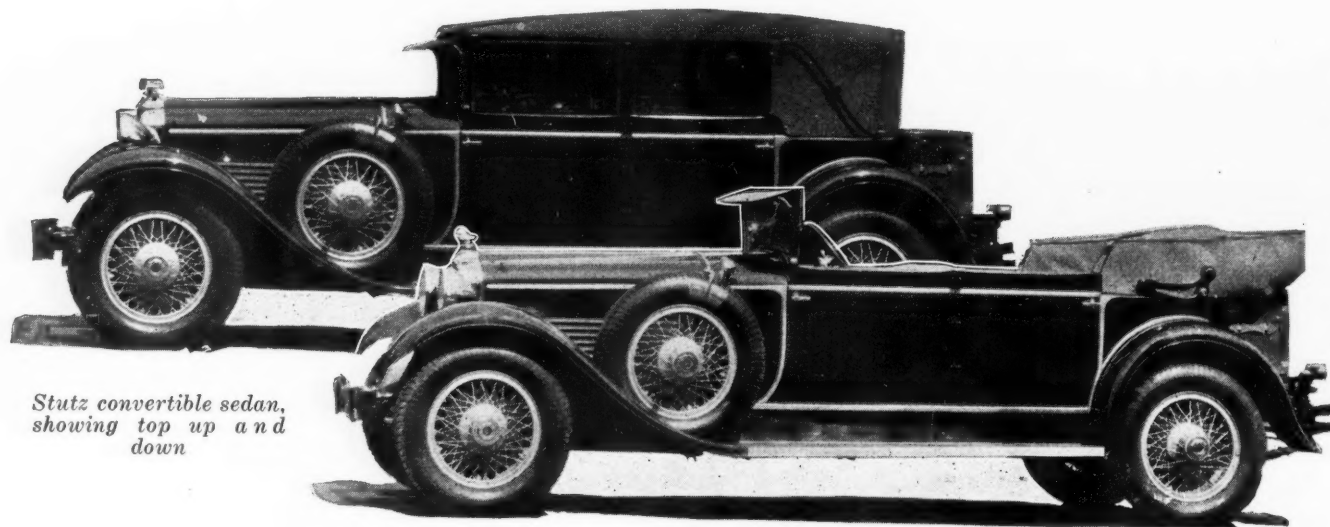
The pillars rising from the center of the body to form the posts between front and rear doors may either be removed or left in position when the top is down. A small compartment is provided under the rear seat cushion for storing these pillars when removed.

A trunk is mounted on a stationary platform at the rear of the body and is designed as an integral part of the car. It is cowhide and is fitted with two commodius suitcases and a hat box.

The opera-type auxiliary seats in the seven-passenger limousine body are secured to the back of the between-compartments partition. The left seat faces forward and the right seat faces to the rear.

The five-passenger sedan is priced at \$3,995, the five-passenger limousine at \$4,095 and the seven-passenger limousine at \$4,195.

A SUFFICIENT number of written acceptances having been received for Simplified Practice Recommendation No. 56—Carbon Brushes and Brush Shunts, recently revised by the industry, the Division of Simplified Practice, Department of Commerce, announces that the project is now in effect, as of Nov. 1, 1927, subject to annual revision or reaffirmation by the industry.



Stutz convertible sedan,
showing top up and
down

Just Among Ourselves

What the Engineers are Thinking About

HERBERT CHASE, Erickson Co., in connection with a paper he prepared recently for the S.A.E., asked a number of leading engineers what design innovations or trends they saw coming in the future. He got some interesting replies. Riding qualities, for example, are quite evidently in the foreground of the minds of many technical men in the car factories; individual wheel springing, better controlled springing and generally better riding and handling qualities, for instances, were factors prominently mentioned. Other items included shorter engines of high power, very high speed motors with cuff valves, radical changes in fuel systems to improve thermal efficiency, two-speed axles or overspeed transmissions, worm drive, buses with powerplants located in the rear, six-wheel buses with drive on four wheels, automatic brake adjustment and some development involving the elimination of the present transmission. Any one of these ideas probably would furnish meat for a good pitched battle in any assemblage of three or more passenger car engineers; it is interesting to look over the list anyhow.

* * * *

Merger Planned on Sound Basis

ONE fundamental exists in the recent merger plans of the Motor & Accessory Manufacturers' Association and the Automotive Equipment Association which bodes well for the permanency and progressiveness of its future success; the plans seem to have been worked out purely on the basis of what would be best for the industry as a whole and of the

various elements directly involved. Personalities have not warped the vision of the program. The plan for the combination has been built solely around industrial and commercial needs of the members. That means that unusually broad vision has been exercised by those most active in the development of the proposed program. While the bringing together of the constructive thinking of a number of able men has been necessary to the consummation of the merger, it would probably be difficult to appraise too highly the broad-visioned and able part played by M. L. Heminway, general manager of the M. & A. M. A.

* * * *

Service Experiences No. 3

(From E. C. Steinfeld)

I enter the Blank Truck Co. branch, a fine big building. Wait in vacant office five minutes. Finally spy well-dressed man in distance. I hail him: "Where's the man who takes care of used trucks?" He replies: "Ha! Ha! Everybody who has'm takes care of 'em." Conversation continues as follows:

"I'd like to see the man who sells used trucks."

"He's out."

"When will he be in?"

"Don't know."

"Anybody else who can give me some information?"

"Oh, I guess I can."

I am lead into service station. Then I ask:

"Is this truck for sale?"

"Yeah."

"When will the used truck salesman be back? Or perhaps the manager

could give me a price? Is he about?"

"Oh, I'm the manager. I was just kidding you. I'll sell you the truck."

From that point on this manager was a perfect gentleman and a good salesman. But I'm still wondering how much money this type of humor is losing for his company.

* * * *

"Shall We Fly the Atlantic?"

SO much has been written hurriedly about both the successful and unsuccessful attempts to fly across the Atlantic that a calm summary of what actually has happened in trans-oceanic airplane flights and some attempt to evaluate dispassionately their present and future significance is particularly interesting to automotive men just at this time. Thus far the most useful information regarding the hazards, experiences and possibilities has come from those who returned successful, but in each case there were obviously various factors hindering any one of the successful men from discussing publicly with utter frankness the entire question. These thoughts are generated by an article which we have just read in the July *Harper's* by Charles J. V. Murphy, called "Shall We Fly the Atlantic?" At the risk of being accused of free publicity we urge this story as one of the most interesting, informative and constructive on this subject that has yet come to our attention. While non-technical in character, it has been written, so far as our limited knowledge can determine, with a clear conception of the technical problems involved and a sincere discussion of them.—N.G.S.

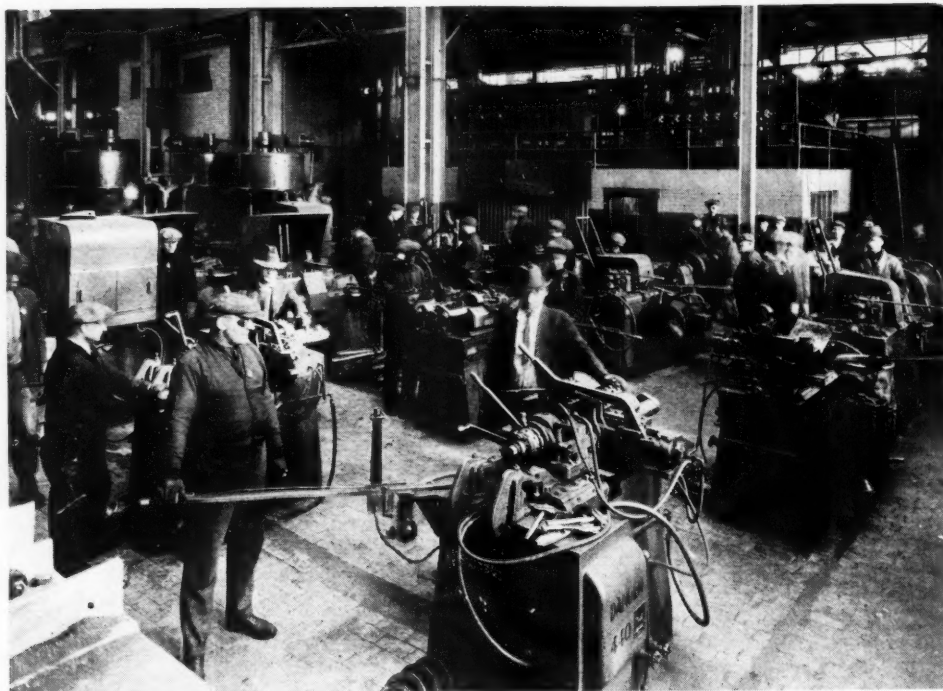


Fig. 1—Welders at work on the Ford axle housing

Intricate *Welding Operations* Vital Part of Ford Production

Total of 128 welds per car made on new Model A. Automatic machine developed for differential housing doubles output. Processes described by M. L. Eckman.

IN A paper read before the American Welding Society at its recent annual meeting, M. L. Eckman, welding supervisor of the Ford Motor Co., gave illustrated descriptions of some of the welding operations employed in the production of the new Model A.

One of the most interesting production processes in which welding plays a large part is that of the rear axle housing. This housing is made up of three parts—the central cylindrical part, or differential housing, and two axle trumpets, which are practically duplicates. Each axle trumpet in turn is made up of four parts, which are welded together into a single unit weighing only 18½ lb. One of these parts is the spring perch, which is a forging that is accurately machined and has the case-hardened ball for the shock absorber welded to it. This is a flash-welding operation and is performed in a Ford-designed machine at the rate of 150 per hour, the welded area being 0.75 sq. in. After the resulting burr or flash has been removed, the part is ready for the next operation, that of flash-welding to the tube. The weight of the part is 5 lb. 4 oz., the area of the weld is 1 sq. in., and the welding operation is performed at the rate of 100 per hour.

The tube is made from a wedge-shaped blank punched from ⅛ in. sheet steel; it is 20⅝ in. long and weighs 7 lb. 4 oz. Forming of the tube is accomplished in three operations in a punch press, and the tube is then arc-welded along the seam at the rate of 50 per

hour. After being restruck to insure uniformity of size and shape, the tube is ready to be flash-welded to the bell-shaped end forging, which latter welding operation is performed at the rate of 60 per hour, the weight of the forging being 7 lb. 13 oz. and the area of the weld 1.50 sq. in.

This bell-end forging is produced by a process specially developed by Ford engineers, by hot-forging or spinning a blank of hot steel between two formed rolls at high pressure and high speed.

This method produces a gracefully curved bell, uniform in thickness and at no sacrifice in strength.

Joins are Permanent

The four pieces have now been made into one by welding. Where the parts are thus welded the sections are equal; there is no overlapping of parts and consequently no sudden change in strength and resulting concentration of stress. The joints, moreover, are of a permanent nature and will not shift or become distorted in service.

Mr. Eckman states that the axle housings in tests have withstood 25 tons torsional strains without failure. This presumably means that the calculated stress in the material in torsion was 50,000 lb. p. sq. in. The tubes collapse under a torsional strain of 50 tons without failure of the weld. In an endurance test, in which the bell-end was clamped solid and the other end oscil-

lated by means of an eccentric through a range of $\frac{1}{4}$ in., at 250 r. p. m., failure occurred after 167 $\frac{1}{4}$ hours, or 2,508,745 oscillations.

The center part of the rear axle housing, referred to as the differential housing, consists of a channel section rolled in the Ford steel mills and formed into a circular shape by four punch-press operations. A neck forging, made in three operations in an Ajax forging machine and then rough-machined, is welded to it. This welding operation is now performed on an automatic machine and to emphasize the improvement in production represented by the use of this automatic machine, Mr. Eckman described the process by which this part was previously made.

The channel ring was placed in its cradle and aligned. The removable clamps were dropped in place and a valve was turned which released air into two cylinders, which in turn actuated the clamps and pulled the ring against the electrodes on both sides. The operating handle was then pushed back from the loading position to the open, or starting, position. The neck was slipped over the expanding collet, which was also the electrode, against a locator, and aligned. The forked clamp was slipped in place and the air turned on to expand the collet.

At this point the actual welding operation started. The operator gripped the handle and threw the trigger switch, thereby turning on the current. He then burned off the abutting ends of the neck and ring to get a good even contact. Then the ends were held tightly together and preheated for three or four seconds. The arc was then drawn between the parts by backing off the handle. Thereafter the operating handle was brought up evenly and steadily to maintain the arc to a predetermined point, and when the correct heat had been reached it was pulled home quickly and vigorously by two husky men. While this procedure is easily explained, it took very careful training before the men could carry it through properly, and it was a most difficult problem to work out in an automatic machine.

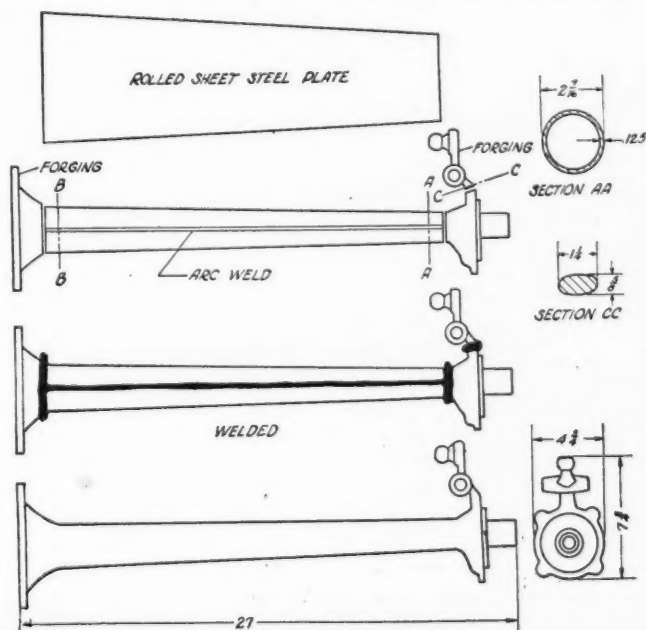


Fig. 2—Steps in the production of the rear axle

The air was next released, the clamps were removed, the operating handle was pushed back to the open position and the housing, completely welded, was lifted out. Each machine required three operators and the production was between 25 and 30 per hour.

The automatic machine now used operates on the same principle, except that the two ring clamps are part of the machine and the operator's duties are limited to placing the work in the machine, slipping the U-shaped clamp on the collet end and turning the air valve, which clamps all parts at once. The pedal is then tripped and the machine goes through the welding

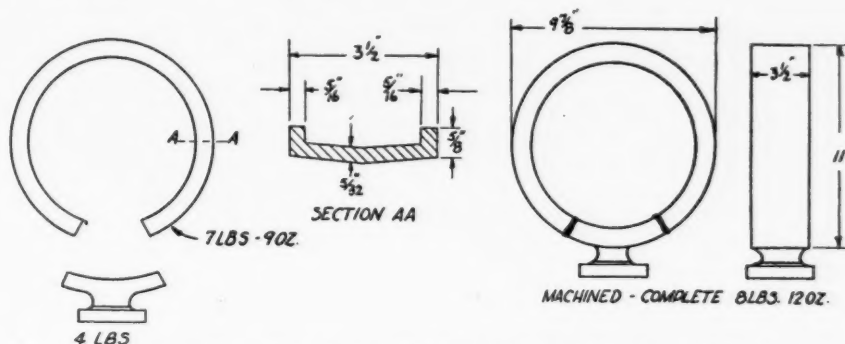


Fig. 3—Showing how differential housing is built up from the bent piece of channel and a forging

cycle automatically. Then the air valve is opened and the machine returns to the starting position, where the housing is removed, which completes the cycle.

Adoption of this automatic machine resulted in better work at reduced cost. One operator runs this machine, as compared with three previously required; the production was doubled, being now at the rate of 50-60 per hour; only about 75 per cent as much floor space is required by the new machine, and the welds are more nearly uniform, as the human element has been eliminated from the operation.

This housing weighs 8 lb. 12 oz. and has a weld area of 2 $\frac{1}{16}$ sq. in. At the time the paper was prepared it was the largest weld in regular production work, although much heavier welds were then under development. The housing crushes under a load of 12 tons and fractures under an expansion force of 80 tons, all fractures occurring outside the weld.

Production Rate High

The sequence of operations on other manually welded parts is practically identical with that on the hand-welded housing as described in the foregoing; usually there is only one operator to a machine, and on the smaller parts the production runs as high as 200 per hour.

The automatic machine is receiving much attention at the Ford plant at present, and future machines will mostly incline toward this type because of the uniformity and speed assured by it. In the production layout for the axle housing the progressive plan has been adhered to by Mr. Ford; the part moves progressively from the point where the forgings are made from the billet to the point where the last machining operation is performed on the housing, and it does not travel very many feet in the process.

In the production of differential ring gears, steel, rolled in the Ford mills, is cut to length, the rings are formed in the Ajax machine and flash-welded, and the blanks are then machined and have the teeth cut.

The propeller shaft housing consists of a tube of which a flanged forging is flash-welded at the rear, and

a ball forging at the forward end. The ends are machined after the parts are welded up, which assures alignment. Terminal forgings are flash-welded to the radius rods of the rear axle at both ends. In the case of the front axle radius rod, a terminal forging is welded to the forward end and a yoke forging to the rear. The irregular tube which forms this radius rod is blanked, formed, and arc-welded longitudinally.

The brake equalizer shaft consists of two forgings

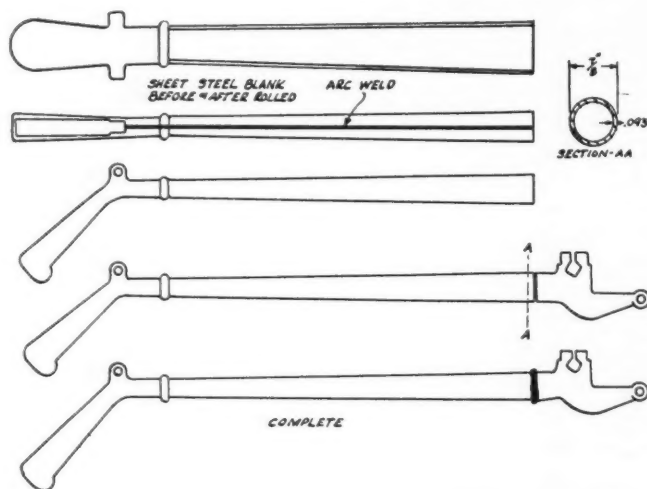


Fig. 4—The hand brake lever, built up from sheet metal by welding

that are welded to the ends of a bar. Pads for the brake and clutch pedals are welded on. The four brake rods have their terminals welded on. An interesting process from the welding standpoint is that of the production of the brake lever. The different steps are illustrated in Fig. 4. The lever is made of sheet metal. It is blanked, formed and arc-welded longitudinally, after which it is flash-welded to the terminal forging. The lever being hollow, the pawl rod is concealed inside of it, which is quite an improvement from the standpoint of neatness over a pawl rod outside the lever. The weight of the lever is $1\frac{1}{4}$ lb.

The Ford muffler is produced from sheet steel by punching and welding. An outer shell is blanked from a sheet .037 in. thick and formed into a taper tube and spot-welded. The center baffle A (Fig. 5) is spot-welded in place. The large bell end, which is blanked and formed in a punch press, is flash-welded into the large end of the outer shell. The small bell end, after being blanked and formed, is welded into the small end of the tube. The center shell, which has two baffles spot-welded in it, is inserted through the small bell end and the center baffle, and is spot-welded to the large bell end at J. The rear end of the center shell is left free to allow it to expand when heated by the exhaust gases. The inlet pipe is flash-welded to the center shell and large bell end at K, while the outlet pipe is flash-welded to the small bell and F. The weight of the muffler is 12 lb. 7 oz.

A distinctive feature of the Ford Model A is the all-steel wheel, which is very strong in relation to

its weight. Forty attempts to break it by skidding it against the curb sideways resulted in bending some spokes, but did not render driving impossible. Five wire wheels complete weigh 36 lb., less than four wooden wheels and a spare rim, and the reduction in weight has been made mostly at the rim, where excess weight is particularly objectionable.

The hub shell is blanked and formed in seven operations on a punch press. The rim is made from a strip of steel that is formed into a circle and has its ends flash-welded together. It is then roll-formed and embossed. The spokes are cut off, upset and cupped on a cold heading machine direct from the coil of steel wire. The rim is placed in a special welder and 10 short spokes of the same angle are welded in place, one at a time, the machine indexing and welding automatically. The 10 short spokes of opposite angle are welded in in another machine of similar design. Next the hub shell is assembled and welded to the spokes in two separate operations. The long spokes are next welded to the rim and then the hub shell. Thus there are six welding operations in all, of 10 welds each. There are 30 spokes in all, and these and the rim and hub shell are united into a single part. The short, inner spokes are arranged tangentially to take torque in both directions, in addition to radial loads, while the long, outer spokes are radial.

Battery Cradle Welded

Headlamp brackets and fender braces on the Ford are made of tubing and have forgings welded on at both ends. The battery cradle is made of a piece of strap steel that is formed in a punch press and welded to two terminal forgings at the same time. The webbed bottom plate is placed in a corresponding web and spot-welded in place. This battery cradle is strong enough to lift the car by, but it is quickly and cheaply made by welding.

The steering gear is a forging made in halves that are arc-welded together and then flash-welded to the tube. The front brake shaft housing is a tube that is formed from sheet metal, arc-welded longitudinally and then flash-welded to terminal forgings on both ends. Two of these are required per car.

The starter shaft is made in two pieces that are flash-welded together. The steering tie rod is arc-welded. The baffles and clamp reinforcements of the

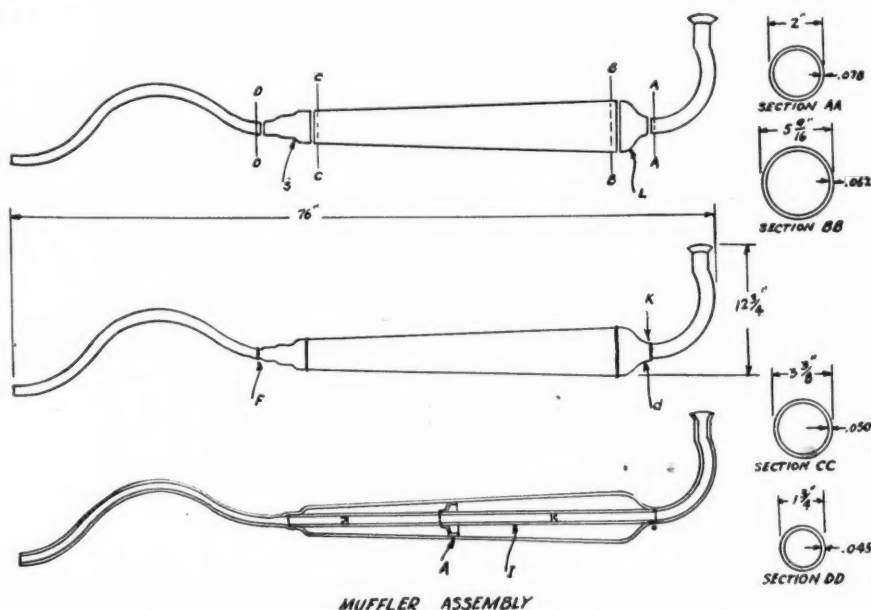


Fig. 5—Manufacture of the muffler from sheet metal

engine oil pan are spot-welded. The outside plate of the clutch and its washer are assembled by spot-welding. The brake shoes also are welded. There is a total of 128 welds per car.

The radiator fan is of unique design and involves what might be termed precision welding in its production. It is of the aircraft propeller or helical type. The hub is made on an automatic screw machine, while the pulley body is a stamping. These parts are flash-welded together in a machine of Ford design, the tolerance on alignment being 0.0025 in., and it is checked at a point away from the weld, so the weld must be held to an ever closer limit. The hub flange is next spot-welded to the pulley, and then the fan is clamped in place and spot-welded. The latter is made of two steel punchings that are formed to shape and then seam-welded on a machine that is specially designed for the purpose. One man produces 150 fans per hour.

The radiator stay rod, which is tubular, is made like other similar parts, the central section being a tube formed from a punching, seam-welded and then flash-welded to terminal pieces made from steel wire on a cold heading machine and threaded in a thread roller. The production on the latter operation is 2500 in eight hours by one man. The weight of this stay rod is only 6 oz.

The doors for closed bodies are made in four parts, stamped in a punch press and flash-welded together. All parts of the door are assembled by welding, including the bumper plates, belt panels, window runs, outer shells, etc. This makes an exceedingly strong door. The windshield frame, the rear window frame and the side window frames are all flash-welded assemblies, while the accelerator consists of a forging and a rod flash-welded together. In general, welded design makes for strength, lightness and speed, combined with beauty,

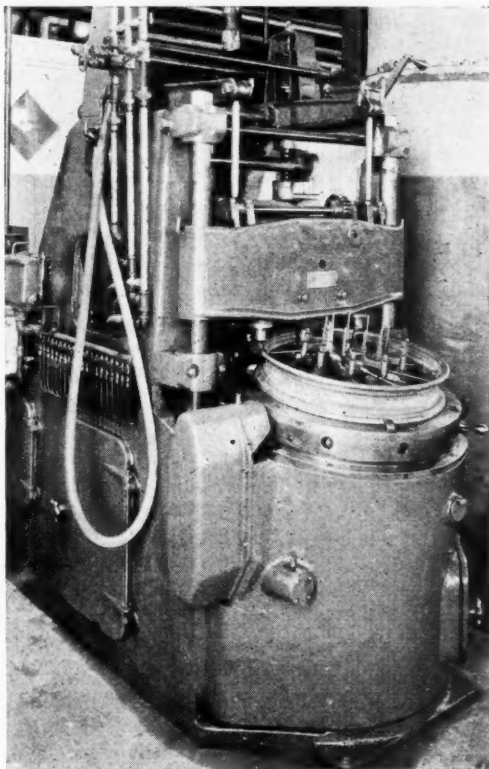


Fig. 6—Welding operation on the Ford metal wheel

and the possibilities of this method of production are far from being exhausted; in fact, the surface has been merely scratched.

One of the important parts of the Ford car on which welding is extensively used is the fuel tank. This part takes the place of a cowl, an instrument board and a special fuel feed system. It is made from terne plate

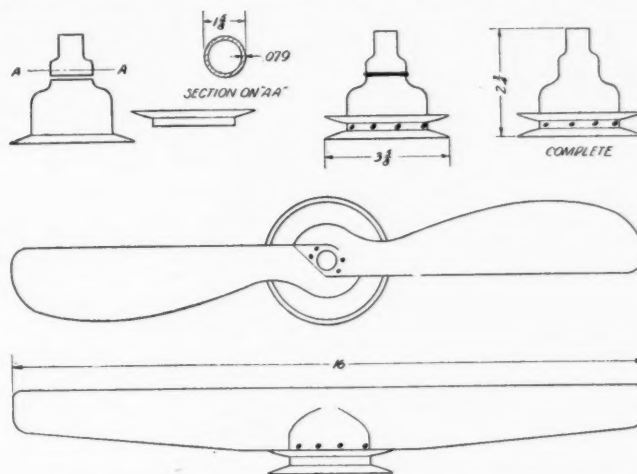


Fig. 7—The propeller-type fan with integral belt pulley

or lead-coated steel to prevent rusting. The job of welding this tank, which is made in two parts, was a most difficult one and three years were spent in developing the welding equipment and processes. None of the machines on the market could be made to do the job as desired, so special machines were designed for it, and then redesigned, until success was finally achieved.

In the inspection of these tanks they are filled with compressed air and submerged in water. They are welded by being passed between copper electrode rolls at the rate of 40 in. per minute, the upper roll being driven and the lower one idling. As the joint advances there is a surge of current at regular intervals, and this generates the heat which in conjunction with the pressure applied produces the weld. In order to insure uniform, dependable welds, the following factors must be guarded against: Uneven, irregular or dirty stock; improper bearing conditions; fluctuations in primary current, improper width, pressure and condition of rolls, improper speed and condition of interrupters, faults in cooling system and incorrect welding speeds.

Buses Help Railways

IF it hadn't been for the buses, the combined operations of 322 electric railway companies participating in a survey made by the American Electric Railway Association would have shown a decrease in net operating revenue in 1927 as compared with 1926. This group of railway companies controls 153 bus undertakings and, on rail operations alone, their net operating revenue declined \$1,851,697 from the 1926 level. Including bus figures, however, their net operating revenues showed a gain of \$954,322. In 1926 the books of these companies showed a combined operating deficit for bus operation of \$14,389 while in 1927 operating revenue was in excess of operating expense by \$2,791,180. The electric railways in recent years have recognized the possibilities of the motor bus in a rather substantial way and these figures are an indication of the general soundness of this policy.

CHISHOLM-MOORE HOIST CORP., Cleveland, has brought out a new differential hoist named the Blue Boy which is equipped with Hercules Inswell electric welded load chain.

Fageol Thinks Buses Will Replace Street Cars in 20 Years

Latest motor coaches capable of handling mass transportation as efficiently as trolleys, he tells delegates at A.A.A. Bus Division convention. Sees gradual substitution.

DURING the last year and a half several makes of buses have been introduced in this country which are really ultra-modern street cars freed of the limitations of steel wheels and operating on pneumatic tires without loss of transportation carrying advantages and with all of the maneuverability of the automobile gained, Frank R. Fageol, president, Twin Coach Co., told delegates at the recent convention of the bus division of the American Automobile Association.

Predicting that street railway systems would eventually give way entirely to buses, he said in part: "The claim can no longer be sustained that fixed rail cars are more efficient in handling mass transportation than the modern motor coach, and since this is such a recent development and so very few people are really familiar with its significance, it is only natural that the general trend of thought is that rail type transportation units are the only practical means of handling mass transportation. I am firmly convinced that fixed rail urban and suburban transportation will ultimately disappear from our streets; however, I believe it will take 20 years to make any appreciable change and the aim and effort of all people truly interested in the economics of the situation should be to work in harmony and develop ways and means for gradual substitution of motor buses for rail cars to the end that the great public investment in rail systems shall be conserved and, insofar as possible, returned to the investors.

"In order to reconcile your views to the foregoing statement, I suggest that you stop and take into consideration the following facts: Twenty years ago there were substantially as many miles of fixed urban track and as many electric street car units operating as there are today, but very few automobiles in general use. Today, in addition to the street cars, there are approximately 25,000,000 automotive vehicles operating on our streets. Naturally, this condition has created an entirely different traffic and transportation problem from that with which the public was confronted 15 or 20 years ago.

"All people seem to be victims of custom and habit. If you will drive your car a day you will probably find you have been delayed anywhere from five to 10 minutes behind a street car and while you may not particularly like this, you do not build up in your mind any great resentment over the

fact, simply because the street car and fixed rail system was a fixture on the street before your automobile came and you unconsciously make allowance for it. On the other hand, if you are driving in the country and are delayed as much as a half minute or a minute behind a motor bus or truck you are apt to fume over the delay and think many unkind things about the manufacturer and the operator of such a vehicle. This mental attitude is probably produced because the automobile was a fixture here prior to the motor truck and motor bus.

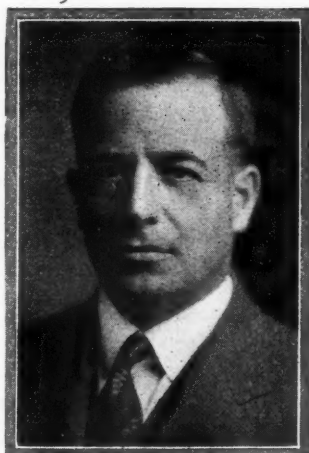
Motor Vehicles and Congestion

"Carrying this line of thought a little further, try and visualize what would happen if all automobiles and all vehicles on a street had to pursue a perfectly straight line as does the fixed rail unit. I believe it will be agreed that our streets today would not be able to take care of any more than a small portion of the traffic. It would mean that the delay of each vehicle would be multiplied in line with the particular cause of the delay. It is by a contrast of this kind that we come to a real appreciation of the mobility and flexibility of the automotive vehicle. While some people may claim that a straight line is the shortest distance between two points, surely no one can claim that it is the quickest distance between two points when progress between said two points is barred by obstructions which cannot be negotiated.

"In the final analysis, the economics of the situation must prevail and the economics of transportation are necessarily made up of the following dominant factors:

- "1. Convenience to all the people, including those using public transportation units and those using private transportation units.
- "2. The time element.
- "3. The cost.

"Our experience teaches us that the actual direct cost per mile of operating a modern bus of large seating capacity is about the same as the direct cost of operating an electric rail street car. But since there is a difference in the total investment per transportation unit between the modern bus and the street car of about 1 to 2½ (a modern bus unit with all garage and service equipment costs about \$14,000 as against about \$35,000 for a street car unit including tracks, overhead, etc.), there is necessarily a difference in interest charges and amortization anywhere from four to



Frank R. Fageol, president, Twin Coach Co.

seven cents per mile in favor of the motor bus in operating costs. Therefore, if our present large transportation companies will, if and when a considerable portion of any piece of track needs replacing or repaving, replace that entire line with modern buses, using the good cars removed therefrom on other remaining trunk lines of the system and then use this saving of four to seven cents per mile as a sinking fund, we feel that practically the entire street railway investment can be amortized and returned to the owners in a period of 15 to 20 years.

Interurban Service

"Regarding interurban bus service, it is again apparent that the modern large carrying capacity motor coach is going to play a very large part as a practical substitute for the majority of fixed rail local transportation lines between cities, perhaps even up to and including distances of two to three hundred miles.

"The foregoing statement is based on the fact that up to the present time bus fares and railroad fares have been substantially the same rate per mile. This was because the operating costs of smaller buses made it necessary to charge 3 to 3½ cents per mile. Today with larger and more modern buses which can be operated at practically the same cost, it is possible to profitably operate a bus line when there is a fair density of traffic at an average fare of 2 cents per bus mile. Eventually, if the present situation is any criterion, most local interurban bus fares are going to settle down around this figure.

"In addition to the economical advantage to the passenger, one other great contributing factor in the popularity of the bus lies in the fact that it is free to tap any and all parts of communities most convenient to the public and can readily adapt itself to changing centers of population, without the tremendous investment necessary to rail extension and changed rail routes. Added to all this, of course, is the feeling of most people that there is a more pleasant sensation and more comfort when riding in a free-moving highway vehicle than there is when riding on fixed rigid rails.

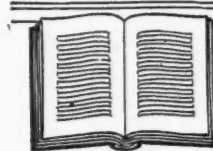
"We do not believe that, even though the bus finally accomplishes everything in transportation that is contemplated in these remarks, it will eventually work out to the detriment of fixed rail systems, for the urban systems can be gradually adapted to do what might be termed the jobbing or long distance transportation of both freight and passengers. If this country were today to spend several billion dollars in improving the highways and then put motor buses and motor trucks on every one of them, it would be the greatest possible boon to the steam railroads, because to them it would be equivalent of building branch lines into every section of the country as feeders for their main and trunk lines without the investment or the loss attendant upon operation.

"Another point to be taken into consideration, and I believe generally misunderstood, is the often raised question and theory that the states and counties build the highways and right-of-ways over which motor buses operate without paying anything for the operating privilege. To those who think along this line I try at every opportunity to point out that it is most erroneous. The facts are that the motor bus is merely fortunate in being able to take advantage of and use a highway which had to be built for the convenience of the general public and in the use of which the motor bus probably in no instance represents

more than three to five per cent of the total travel thereon. In other words, the cost of building and maintaining the highways can be and is properly divided among everyone who can use them, whereas in the case of the railroad, since this right of way and roadbed is for private use, its construction and upkeep should be chargeable to the railroad alone.

"Recently in the State of Kansas, the Interstate Bus Company, operating between Kansas City and Topeka, was threatened by the Legislature with increased taxes, notwithstanding the fact that it was already paying a very fair tax. In arguing against the threatened increase, H. H. Moore, president of the company, discovered and presented some very interesting facts, viz., that his buses by actual traffic count represented only 3 per cent of the traffic on the 76 miles of highway, whereas the taxes they were paying were sufficient to pay for 78 per cent of the total maintenance cost of the seventy-six miles. The figures used in his argument were furnished by the United States Highway Department and confirmed by the Highway Department of the State of Kansas, and it is needless to say that upon presentation of the figures, the very people who were advocating increased taxes through misinformation were very frank to state that the taxes were really too high, and they dropped the case.

"The figures compiled by your organization prove that all buses, almost without exception, are paying more their fair share of the highway cost. Unfair, restrictive and exorbitant taxation levied against the bus cannot help but be reflected in increased cost to the consumer of highway transportation. The public is beginning to realize this and is reluctant to be a party to any movement calling for a rate of bus taxation disproportionate to the use of the vehicle makes of the highway."



Books for the Business Bookshelf

Standards Yearbook—1928

Bureau of Standards, Washington. 399 pp. \$1.

THIS is the second issue of the Standards Yearbook and like its predecessor it is concerned mainly with indicating progress during the year of 1927 in standardization activities. The activities and accomplishments of practically all agencies, governmental or commercial, domestic or foreign, which have been interested in standardization work is outlined in the book, so that it provides a valuable source of information for anyone desiring to learn what has been done or is contemplated toward standardization of almost any item or by any particular organization.

Storage Batteries

By Morton Arendt. D. Van Nostrand Co., Inc., New York. 285 pp. illus. \$4.50.

THIS volume covers all phases of battery manufacture, assembly, upkeep and care and application and use, so that some parts of it, at least, should prove of value to anyone interested in storage batteries in any way. Theory has been subordinated to practice with only enough of the former being given to explain the latter. Much of the book is devoted to lead plate cells but a chapter is also given to cells of the nickel-iron-alkaline type. Storage battery testing and applications each are covered by a separate chapter.

Suggests Plant *Depreciation* Based on Changing Dollar Value

Plan as applied particularly to machine tools and factory equipment would give industry much truer picture of actual operating costs, says Ernest F. DuBrul.

By K. W. Stillman

AT the 1928 spring meeting of the American Society of Mechanical Engineers, Ernest F. DuBrul, general manager of the National Machine Tool Builders' Association, presented some ideas concerning depreciation as applied to machine tools and plant equipment, which, while in themselves perhaps not entirely new, probably would be unique in their application to the accounting practices of most plants.

Mr. DuBrul's main point was that while the purchasing power of the dollar is constantly fluctuating, the depreciation policies of most concerns give no consideration to this fact, but proceed on the basis that equipment purchased in 1915 or 1920 for \$10,000 can be replaced for \$10,000 in 1928. This condition, Mr. DuBrul believes, is misleading many executives into thinking their business is profitable, when actually it may not be, or into making their manufacturing costs higher than they need to be and thus affecting their marketing plans in an unfavorable manner.

When a machine tool is purchased at a certain date a definite number of dollars are spent for it and at that time the number of dollars so spent accurately measures the value of the new asset. Present accounting practice, however, proceeds from this point on the assumption that this same number of dollars, less depreciation, continues to measure the changing value of the asset and so carry the information on their books of accounts which are employed in determining cost of production.

It is a business axiom, adhered to even by accountants, that a concern to be operated at a profit must first pay all its expenses, including those which are deeply hidden as well as those which are obvious. Mr. DuBrul contends that this axiom is not practiced in fact, because unless consideration is given to changing dollar values true costs of production cannot be determined.

To illustrate what happens under these conditions,

Mr. DuBrul followed the progress of a company which erected a \$100,000 building in 1913. During 1920, an identical building was erected, but at a cost of \$250,000, and in 1925 a third building, identical with the other two, was erected, this time at a cost of \$200,000. These changes in cost correspond closely to actual fluctuations in building costs over the period covered and are typical of the changes taking place in the general purchasing power of the dollar.

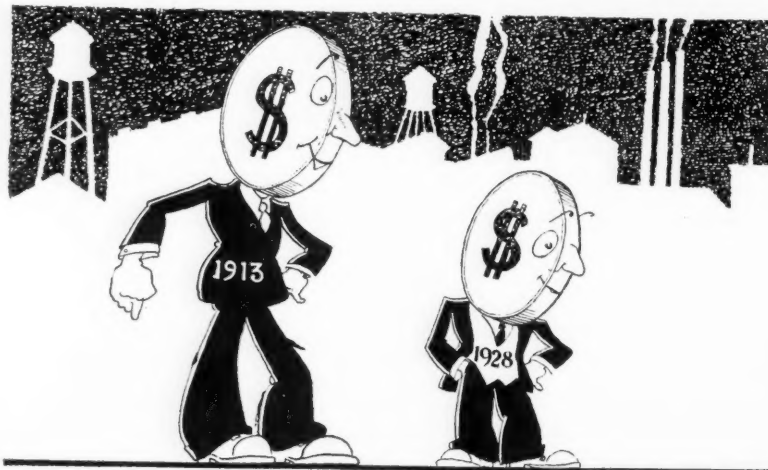
To make the problem even more simple he assumed that all other costs pertaining to the three buildings are the same and that a depreciation charge of 3 per cent per year is charged against each. The buildings are supposed to house identical departments with the same machinery and to be turning out the same product in the same quantities.

Under these conditions, Building No. 1, built in 1913, will be charged \$3000 depreciation; Building No. 2,

built in 1920, will be charged \$7500, and Building No. 3 will be charged \$6000. Now, Mr. DuBrul asked, is it true that the superintendent of Building No. 1 should get the biggest bonus because he will have the lowest costs, and should the superintendent of Building No. 2 be penalized because his costs will be higher?

Mr. DuBrul makes the point that according to most accounting methods this would happen; the cost of production would be said to be highest in the 1920 plant and lowest in the one erected in 1913.

Of course, the underlying reason for this condition is the income tax laws. Government regulations insist that cost accounting for taxation purposes must carry assets at their original cost, less depreciation. So long as these regulations are maintained it will be necessary for manufacturing concerns to keep books showing these erroneous figures, but Mr. DuBrul points out that even though the business operates six months of the year for the benefit of Uncle Sam, its owners de-



"While the purchasing power of the dollar is constantly fluctuating, the depreciation policies of most concerns give no consideration to this fact, but proceed on the basis that equipment purchased in 1913 or 1920 for \$10,000 can be replaced for \$10,000 in 1928"

serve special consideration during the remainder of the year and one of the most important things which might be done in their behalf is to determine definitely whether the business is actually making any money.

The fact of the matter is that unless depreciation rates are based upon the replacement value of an asset, they can mean very little to the operation of the plant but become simply an account-book figure. Depreciation based on original values might better, possibly, be considered retirement reserves rather than reserves for replacement. Retirement reserves would simply be for the purpose of charging off a book asset but would have very little relation to the retirement or replacement of the physical asset.

In a period of ascending prices and falling purchasing power of the dollar, reserves set up on a basis of original values will fall short of providing for actual replacement. In such a case the operating costs of the concern utilizing such rates are too low and the management may easily be fooled into declaring excess profits, some part of which represent the extent to which capital invested in plant and equipment has been impaired.

When Reverse is True

In the other phase of the cycle, when prices are falling and purchasing power is increasing the reverse is true. During this period depreciation reserves based on original cost overestimate actual depreciation values so that production costs are unduly high with unfortunate results to the concern with strong competition, especially if its competitors recognize the fallacy contained in this method of determining depreciation.

Even if the factor of obsolescence is eliminated from depreciation determination, as is being recommended by some authorities, it will still remain a serious problem to solve in a manner which will reflect the true conditions of the business in the operating statement. Now that managements are recognizing the importance of these matters they are showing more interest in them and are not hesitating to question the present accounting practices, many of which are the result of tradition and are not particularly fitted to conditions of today.

One method which has been receiving considerable consideration, particularly in regard to machine tools, is setting depreciation rates based on output rather than time. Just as the mileage covered by an automobile is a better criterion of its present condition than the year it was produced, so many managers are coming to the conclusion that machine tools should be depreciated according to the service they render.

When obsolescence is eliminated as a factor in the problem this attack is even more successful and it is being found a much easier matter to determine, for example, approximately how many stampings a press will produce, than it is to estimate the number of years it will remain in active production without particular reference to its activities.

Of course, maintenance and depreciation go hand in hand. Under usual conditions the concern which has a liberal maintenance policy can provide a lower depreciation rate than

one which gives little attention to keeping its equipment in excellent repair. The relative importance which these two factors should be given in the operations of any plant is a subject requiring detailed consideration in view of the conditions existing there. Proper decision may often be the means of effecting considerable economies in operations.

Of the four generally used methods for calculating depreciation, the reduced balance method is finding favor among those concerns which do not nor apparently cannot entirely separate the factor of obsolescence from depreciation, but must provide for both in a single depreciation rate.

As is well known, by this method a constant percentage is charged off on the decreasing balance beginning with the original asset and later reducing it to zero in the desired number of years. The advantage of the method is that charges are relatively high during the early years and become less the longer the machine is kept in use. In this way obsolescence is provided against more adequately, possibly, than by any other commonly employed method, because the time when this factor is of greatest importance is when it occurs during the early life of a machine and while it is still in excellent physical condition.

By the reduced balance method large reserves are set aside during the early life so that if obsolescence should take place the unprovided-for loss will be considerably less than it might be under different conditions.

A NEW fourth edition of Capt. R. W. A. Brewer's book on Motor Car Construction has recently been brought out by the publishers, Crosby Lockwood & Son, London. This is an elementary work, written for "engineers, students and motor car owners." The book begins with a chapter on "The Employment of Jigs" and the arrangement of the material in general is rather unconventional. In the new edition some of the newer developments in automobile engineering, such as hydraulic brakes and steam cooling, are dealt with.

New Truck "Drive-away" Method



"Drive-aways" with one driver in charge of three trucks, the latter arranged as illustrated above, are now leaving the Federal factory constantly. Various combinations of models are being handled in this manner. Methods of securely mounting the various chassis have been standardized. Extensive tests over all kinds of roads have proved this method of delivery practical. One of the principal advantages is that it enables Federal dealers to quote lower delivered prices

Manufacture of V-Belts Follows Cord Tire Practice

Built up of layers of rubber-impregnated fabric and vulcanized to shape in molds. Cord layers and breaker strips varied to provide right degree of strength for all uses.

IN the manufacture of V-belts, which are finding extensive use not only in motor vehicles but also in drives for machine tools and all sorts of industrial machinery, the methods employed are very similar to those of the tire industry.

The V-belt is, in brief, a vulcanized molded product made up of various layers of rubber-impregnated fabric just as an automobile tire is made. Fig. 1 shows cross sections of typical V-belts being made by L. H. Gilmer Co., Philadelphia. As may be seen, the general construction consists of a jacket of rubber-impregnated fabric and one or more layers of cards embedded in rubber.

Depending upon the service for which the belt is intended the number of cord layers vary, breaker strips are sometimes added, and additional layers of fabric are employed to provide greater strength.

At the right of Fig. 1 is shown a heavy duty belt designed for trucks and buses which has both an outer and inner jacket, four layers of cords and four breaker strips.

In V-belts as manufactured by the Gilmer company, the first step is the impregnation of the fabric with rubber. Rubber is compounded and mixed in the usual type of mills familiar to all who have visited tire fac-

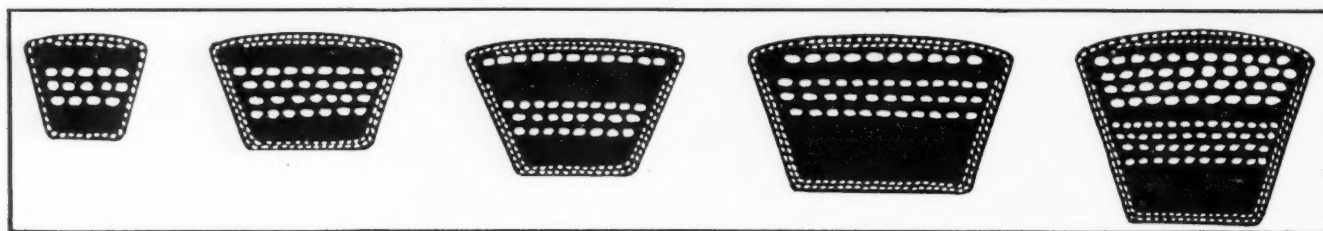


Fig. 1—Cross sections of typical Gilmer V-belts showing construction of jacket, cords and breaker strips

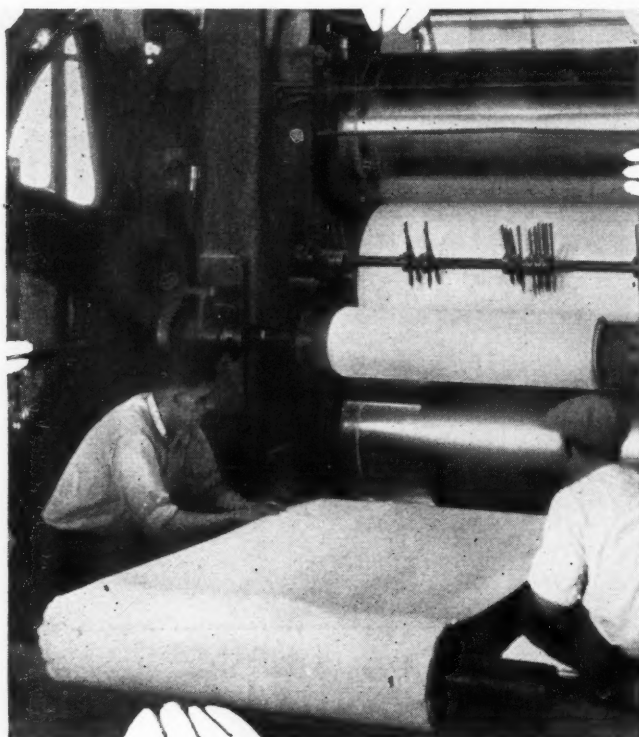


Fig. 2—Calender for impregnating fabric with rubber for jackets and cord layers



Fig. 3—Building up V-belts in sectional molds. The workman is placing layers of cord fabric

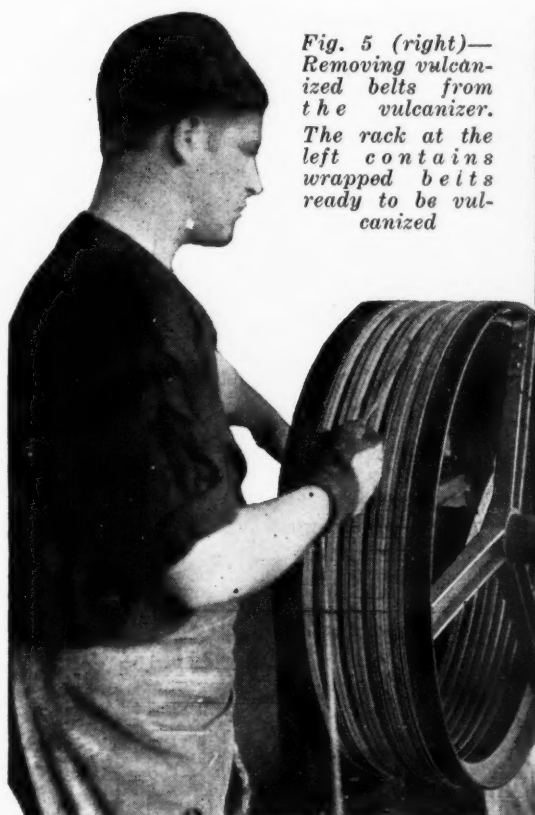


Fig. 5 (right)—
Removing vulcan-
ized belts from
the vulcanizer.
The rack at the
left contains
wrapped belts
ready to be vul-
canized

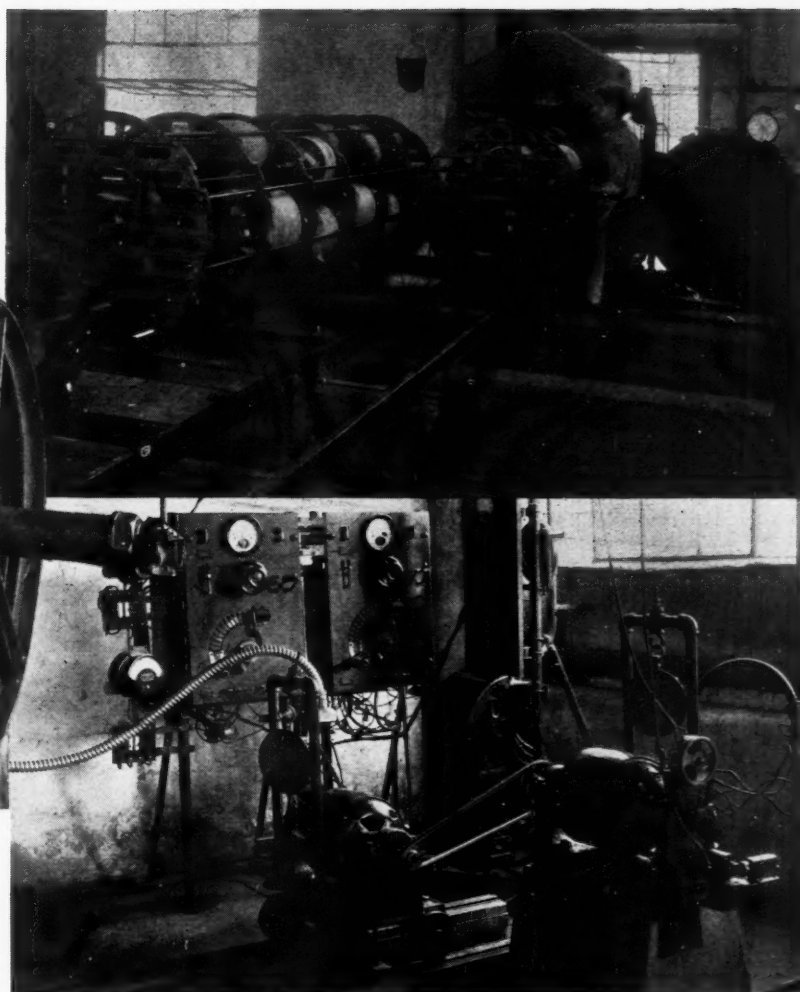


Fig. 4 (above)—Wrapping the mold
prior to placing it in the vulcanizer

Fig. 6 (right)—Dynamometer employed
in testing belts

tories, and then the rubber is forced into the fabric in calenders, as in Fig. 2.

The prepared fabric is cut on the bias into strips of the proper size and the belts are built up on molds as shown in Fig. 3. After the molds have been filled they pass to a wrapping machine, shown in Fig. 4, where they are wrapped with a long band of fabric and are then placed on racks which are run into the ovens for vulcanization.

The molds which are of the built-up type, that is, the mold for each belt is separate and several are combined, as shown in Fig. 3, for facilitating production.

Extensive tests are made on belts and several special pieces of equipment have been designed for this purpose. Fig. 5 shows a dynamometer on which the tension, power transmitted and efficiency of belts can be measured at different speeds and with various pulley combinations.

Fig. 6 shows a break-down test for determining en-



Fig. 7—Break-down test equipment for V-belts

durance and wearing qualities of Gilmer belts. By running the belts at very high speeds and applying heavy loads by means of the weighted levers shown, very severe service can be given a belt in relatively short time.

Indiana 1-Ton Truck

INDIANA Ranger Model 200 is the name of a new 1-ton truck recently added to the line of the Indiana Truck Corp. This new unit has a wheelbase of 137 in. and is equipped with a six-cylinder engine and four-wheel brakes. Tors-Elim three-point mounting of cab, engine and radiator units is used on this model.

The engine is a $3\frac{1}{4} \times 4\frac{1}{4}$ in., valve-in-head, Wisconsin F capable of developing 45 hp. Lubrication is by pressure to all crankshaft and connecting rod bearings. Carburetion and ignition is furnished by Zenith and Auto-Lite equipment respectively. Gasoline feed is vacuum. The cooling system includes a Long radiator with a nickel-plated radiator shell.

The transmission line consists of a Borg & Beck dry plate clutch, three-speed Brown-Lipe Model 20 gearset, Spicer universals and a Columbia Model 36000, semi-floating, bevel gear rear axle. The rear axle ratio is 4.7 to 1. Service braking is through four-wheel, internal, mechanically-operated equipment. The emergency brake is mounted on the propeller shaft. Steering is through Ross gear.

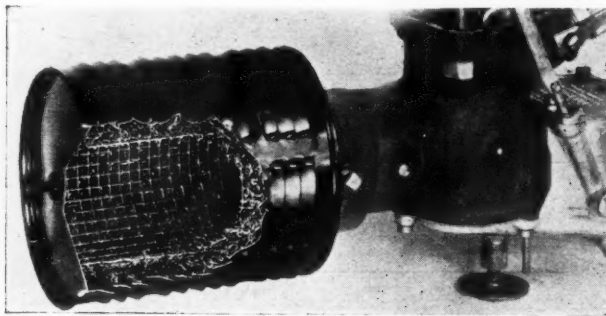
Standard equipment includes Moto Meter, electric starting and lighting equipment, air cleaner, oil filter, speedometer and tire carrier.

NEW DEVELOPMENTS—Automotive

AC Air Cleaner

THE AC Spark Plug Co., Flint Mich., has brought out an oil-wetted louvre-type air cleaner which, in addition to providing efficient air cleaning, acts as a muffler of carburetor noises and reduces fire hazard.

The cleaner, which attaches to the intake of the carburetor, is composed of a porous mass of oil-wetted



New AC oil-wetted type air cleaner

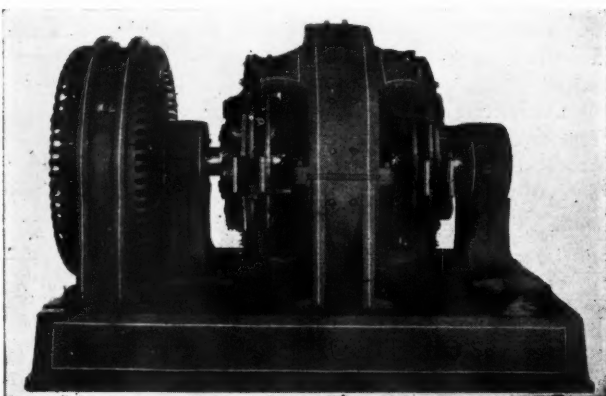
surfaces through which the air is drawn. The filtering material is flat copper ribbon woven in the form of a flat tube which is rolled upon a screen cylinder to form a hollow cylindrical mass through which the air passes. Any dust particles contained in the air passing through the filter are retained by the oily surfaces.

The dense mass of filtering material breaks up and diffuses the sound waves produced in the carburetor so that objectionable hissing noises are eliminated. Underwriter tests show that backfire flames are completely arrested in the cleaner so that they do not reach the engine department.

The filter unit can be removed and cleaned simply by moving it up and down in a pail of gasoline. Reoiling is done by means of a squirt can. Cleaning and reoiling should be done at least once a year under ordinary driving conditions.

Motor-Generator Set

THE Eager Electric Co., Watertown, N. Y., is marketing a motor-generator set designed particularly for supplying power for electrolytic chromium plating operations, and general plating work. The sets are



Eager Electric motor-generator set for plating work

built in standard forms ranging from 2000 to 10,000 amp., at from 6 to 12 volts.

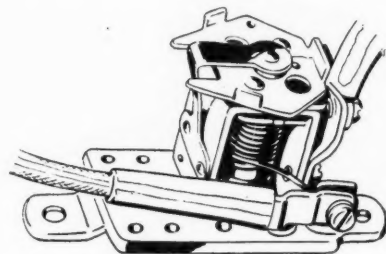
A set consists of a slow speed, separately excited synchronous motor driving a direct current electrolytic generator. The two machines are mounted on a common base and the rotors on a common shaft provided with a two-bearing support. The bearings are Timkens.

The brush holders are steel punchings plated with copper and cadmium to resist corrosion while the brush holder supports are cast integrally with the generator field frame. All connections are made of heavy copper sections and the terminals are heavy copper plates. The frame construction permits good ventilation.

Electric "Safety Valve"

STUDEBAKER cars are now fitted with what is referred to as an electric "safety valve," that is, a buzzer in the electric circuit which begins to buzz and give a warning to the driver as soon as the current in the circuit exceeds 18 amp. This "safety valve" does away with the need for fuses in the electric circuits and therefore eliminates the troubles due to them. In

Short circuit alarm for vehicle electric system as used on Studebaker cars



cases of a short circuit, the device immediately begins to buzz and then cuts down the current flow to 12 amp. It permits of the operation of the car in spite of a short circuit on the lines.

Tracy Fluid Dynamometer

JOSEPH TRACY, automotive consulting engineer of New York, has developed a fluid dynamometer for use in service stations. It comprises a power absorption unit mounted on a base in ball bearings that allow it to rock freely between stops. The outlet of the unit is provided with a valve to regulate the resistance to the flow of the oil, which controls the pull of the dynamometer and the speed of the engine.

At each side of the unit there is an arm which can be connected to a scale for torque measurement. With the absorption unit are furnished a control valve, an oil cooler, a beam scale, a remote dial thermometer to indicate the temperature of the oil, and flexible metal hose oil connections, all of the separate units being mounted on a structural steel frame.

In use, the dynamometer shaft, the end of which is finished with an S.A.E. Standard taper, is connected to the engine to be tested by a shaft with universal joints. The desired load is applied by regulating the control valve of the absorption unit which circulates oil through the flexible hose to the oil cooler and back to the inlet

Parts, Accessories and Production Tools

side of the unit. The pull or torque can be read on the beam scale and the speed can be read from a revolution counter applied to the end of the shaft, or from a tachometer belted to the dynamometer shaft.

The dynamometer is being manufactured by Metal Stamping Co., Inc., Long Island City, N. Y.

Hupmobile Cylinder Heads

HUPMOBILE cylinder heads are machined, and for this work a special milling machine is employed which is provided with six spindles, for use on the six-cylinder engines, and with eight spindles for the eight-cylinder engines. Specially formed end and side milling cutters are employed which cut the concave surface in the sides of the combustion chambers and also surface the top of the chambers. The cylinder heads are placed in the machines in a fixture which locates them from the previously rough surfaced bottom and from the edge of the cylinder head.

The work table is operated by a cam-arrangement by means of which the work is moved about so that the stationary rotating milling cutters form the heart shaped contour of the combustion chambers during a single pass through the machine. Both a roughing and a finishing cut is made, two milling machines being used. Very little stock is taken off at either pass but the operation assures absolutely identical chambers in any one engine, which would not be possible unless the machining was performed.

Alltraffic Brake Lining

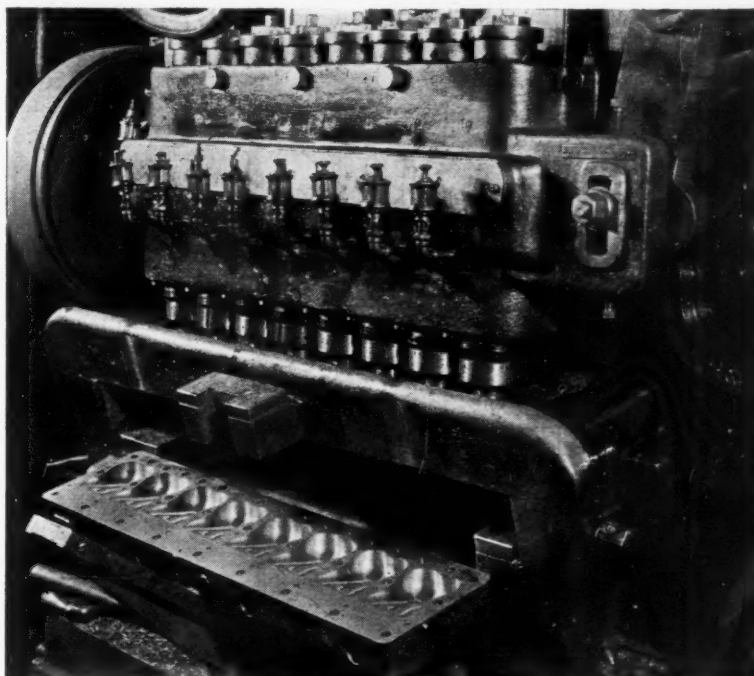
A NEW brake lining material known as Alltraffic is being marketed by the Durwyllan Co., Inc., of Paterson, N. J. This concern has been in the brake lining business for a considerable time, and in the past has specialized on a lining for Ford transmission bands known as the Triplewear. The new lining for general use is subjected to a special curing process. This cure is said to make the lining more resistant to wear, water, oil and grease. The method of weaving the lining also is different from that commonly employed, every stitch being interwoven. When completed the lining is of leather-like appearance and it is said to retain its appearance and physical properties even when worn down very thin.

In connection with this new lining the statement is made that it is more powerful than gasoline (in a negative sense), for whereas one pound of gasoline represents an energy equivalent of 450 hp. min., it takes 350,000 hp. min. to wear out the brake lining of an average installation. The average car has stored up about 2 hp. min. of energy which must be dissipated by the brakes when a stop is made, and it therefore requires some 175,000 stops to wear out the lining, it is said.

New Splitdorf Magneto

THE Splitdorf Electrical Co., Newark, N. J., announces the Splitdorf Model JK-1 magneto which was specially designed for small stationary and light-weight motorcycle engines, and has been adopted by the Indian Motorcycle Co. as standard equipment on the new "Indian Prince."

Unlike other Splitdorf magnetos, the new model is of the rotating armature type. It has a shuttle-wound armature and the high tension coil, the condenser and the breaker rotate as a unit, the contact points being operated by a fixed annular cam.



Set-up for machining Hupmobile cylinder heads

The armature has a large laminated iron core on which are wound the primary and secondary windings. These are treated with an insulating varnish under vacuum and then baked. The field frame is a rugged aluminum casting with imbedded pole sectors on both sides, machined to close limits, the drive-end plate being cast integral.

The circuit breaker is of the balanced, centrifugal, high-speed type, variable up to 30 deg., and fully adjustable. The condenser is built up of alternate sheets of mica and tin foil. This assembly is compressed, treated with a binder, and baked. It is mounted on the armature head and forms part of the drive-end assembly.

The terminal block is of the brush type and molded of Tracnite. It is doweled into the front plate and held in place by the safety gap screw and two upper end plate screws. The collector spool is also molded of Tracnite and made oversize to eliminate the possibility of flash-over under compression or moisture. It is mounted on the breaker end of the armature.

This magneto being designed for use on single cylinder engines, it has no distributor.

U. S. Exports of Cars, Trucks, Tires and Parts

COUNTRIES	PASSENGER CARS						TRUCKS						ELECTRICS		PARTS
	Up to \$1,000		\$1,000 to \$2,000		Over \$2,000		Up to 1 Ton		1 to 2½ Tons		Over 2½ Tons		No.	Value	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value			
Austria.....	14	\$8,792	8	\$10,422	1	\$2,106									\$40,729
Asores and Madeira Islands.....	6	3,195	1	1,416											1,793
Belgium.....	2,237	1,328,138	776	895,043	91	230,209	486	\$209,299	10	\$767			1	\$2,951	196,510
Bulgaria.....	26	17,233	4	4,906			4	2,040							18
Czechoslovakia.....	7	4,137	17	21,433	6	12,711	6	4,570			1	\$988			4,894
Denmark and Faroe Islands.....	1,303	671,333	10	12,653	5	13,849	69	32,523	27	33,114					80,417
Estonia.....															381
Finland.....	350	215,971	146	153,843	39	110,514	43	37,981	38	39,779	1	2,000			38,421
France.....	19	13,806	177	205,061	55	135,948	142	62,311							67,695
Germany.....	1,114	689,838	265	297,606	158	379,920	48	22,490	173	77,363	3	1,815			723,896
Gibraltar.....			1	1,200											82
Greece.....	83	41,932	25	27,723	3	8,920	72	31,352	2	960					13,844
Hungary.....	57	30,663	28	34,119	2	4,850	1	932							3,908
Iceland.....	3	2,058	3	3,575			2	1,834	3	1,947					1,046
Italy.....	159	86,286	65	76,742	6	12,235	35	15,130	27	12,240					44,479
Latvia.....	3	1,368	4	4,262			1	790							5,035
Lithuania.....	4	2,669	4	5,482											125
Malta, Gozo and Cyprus Islands.....	9	6,252					12	5,138							590
Netherlands.....	492	314,724	176	209,647	41	92,174	18	15,094	22	28,715	1	2,000			117,584
Norway.....	166	139,088	59	68,218	3	7,016	25	22,953	17	26,308			4	4,000	25,216
Poland and Dantzig.....	159	107,668	26	32,219	3	8,416	25	20,733	52	35,540					75,709
Portugal.....	231	131,502	44	49,048	11	28,891	27	15,949	26	29,740					8,564
Rumania.....	142	93,092	123	136,520			54	41,425	1	1,383					10,711
Russia.....	6	2,809	3	4,778			88	32,755	4	7,269	6	30,992			34,178
Spain.....	709	425,334	275	355,332	102	241,536	98	53,862	71	65,794	5	6,586			43,270
Sweden.....	1,873	1,069,072	501	521,694	53	135,559	664	361,819	62	94,868	94	55,885			124,015
Switzerland.....	263	261,459	166	184,397	9	19,258			5	7,984					11,109
United Kingdom.....	1,701	931,035	133	159,261	74	166,813	1,254	504,433	72	63,150					579,798
Irish Free State.....	5	1,980	6	7,694											9,063
Yugoslavia.....	9	6,286	12	14,614	7	17,979	1	563	12	14,897					488
United States.....															
British Honduras.....	1	626													726
Canada.....	6,480	3,754,022	1,132	1,364,776	167	461,541	269	192,803	378	555,482	73	156,665	14	8,582	5,004,710
Costa Rica.....	17	11,776	23	26,868			12	8,255	13	6,085					8,229
Guatemala.....	12	9,118	10	14,093	4	13,285	6	4,235	12	21,973					14,163
Honduras.....	1	561					1	845							2,967
Nicaragua.....	5	2,554	2	2,537											3,164
Panama.....	36	24,792	23	23,317	3	9,501	6	4,260	11	10,682					47,858
Salvador.....	9	4,239	9	9,750	2	6,756									4,333
Mexico.....	1,205	592,201	114	147,571	11	32,011	170	82,290	69	107,975	19	64,164			114,051
Newfoundland.....	87	54,522	37	42,432			11	4,300	1	1,208					4,115
Barbados.....	5	2,680													2,100
Jamaica.....	35	20,801	1	1,165					3	3,643	4	8,463			22,839
Trinidad and Tobago.....	15	10,561	6	2,036			4	2,828	2	1,747					3,596
Other British West Indies.....	7	2,337					5	1,341	5	6,185					6,510
Cuba.....	296	146,112	59	75,969	20	52,431	26	11,268	17	21,978	7	10,770			107,844
Dominican Republic.....	92	58,266	7	7,690	4	9,160	22	15,753	20	20,855					12,508
Dutch West Indies.....	9	6,359	6	6,805			18	10,759	1	765					4,550
French West Indies.....	10	6,041					8	4,292	1	480					625
Haiti.....	10	5,266	6	6,987			10	8,595	1	1,164					8,668
Virgin Islands.....	5	3,243	1	1,870					1	480					1,717
Argentina.....	2,865	1,481,504	367	410,103	60	148,906	343	166,135	201	232,181	34	108,393			207,131
Bolivia.....	7	3,996	9	11,154	3	9,061	2	1,850							4,978
Brazil.....	1,284	621,751	169	197,341	33	66,188	439	216,735	113	66,216			1	620	228,298
Chile.....	205	118,022	69	75,292	10	21,797	26	16,775	23	31,336	4	11,276			58,805
Colombia.....	68	53,146	55	66,749	23	75,346	28	27,902	62	98,948	7	16,558			78,949
Ecuador.....	11	5,322	8	10,057			5	2,991	5	5,100					4,194
British Guiana.....	10	8,256	1	1,039					1	480					14
Dutch Guiana.....									1	555					444
Paraguay.....	2	1,600	4	5,288					5	5,034					3,128
Peru.....	124	84,280	24	28,400	3	7,565	6	4,519	46	43,336					34,830
Uruguay.....	277	148,123	70	79,799	18	40,578	72	34,192	25	10,612	6	23,147			44,849
Venezuela.....	43	19,856	31	33,181	7	16,134	17	14,451	4	6,911	2	9,671			39,331
Aden.....	4	2,585	2	2,355											285
British India.....	305	203,237	94	96,520	1	2,120	302	212,768	56	59,962	4	3,124			148,415
Ceylon.....	51	43,546	6	6,380			4	3,102	11	15,921					12,872
Straits Settlements.....	35	28,282	5	7,909	1	2,012	2	2,800							42,587
China.....	155	100,159	8	9,686	3	6,612	4	2,966	16	13,153			5	4,500	65,592
Java and Madura.....	158	114,191	39	42,628	5	10,201	129	66,747	3	4,845					56,157
Other Dutch East Indies.....	9	5,867	7	10,113			4	3,208	1	1,207					15,246
French Indo-China.....	14	6,040							7	3,360					
Hejaz, Arabia and Iraq.....	10	5,250					2	2,012	4	8,190					1,753
Hongkong.....	41	28,810	3	3,694	1	2,517	7	5,678							12,399
Japan.....	1,023	541,035	95	116,184	19	51,927	98	73,034	124	85,341	68	62,685			708,388
Kwantung.....	21	17,264					1	876	5	5,616					1,997
Palestine and Syria.....	62	39,212	4	4,057			10	7,693							7,730
Persia.....	15	7,502					2	2,217	1	480					1,012
Philippine Islands.....	252	148,560	53	68,229	2	4,212	90	47,129	43	50,705			1	1,715	76,238
Russia.....															995
Siam.....	8	3,567							8	6,576					5,676
Turkey.....	57	27,082	5	5,632	1	3,311	21	12,226	10	9,269					8,136
Australia.....	2,113	1,039,895	427	436,372	72	189,133	585	318,918	101	112,237	3	7,438			261,820
New Zealand.....	460	342,082	198	222,709	4	8,920	46	33,881	30	41,489					61,794

for May, 1928

Canadian Exports

TIRES						PASSENGER CARS						TRUCKS		PARTS	COUNTRIES
Casings		Inners		Solids		Up to \$500		\$500 to \$1,000		Over \$1,000		No.	Value	Value	
No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value				
1,678	\$37,725	1,336	\$4,136	5	\$100										Austria
183	1,971	139	245												Azores and Madeira Islands
4,469	63,026	2,922	6,514	24	1,085									\$15	Belgium
70	878	20	42												Bulgaria
1,102	27,289	626	2,188	265	8,577										Czechoslovakia
12,551	156,595	4,731	11,726			6	\$2,598								Denmark and Faroe Islands
343	5,725	459	1,092												Estonia
2,967	49,238	1,029	2,557	8	431										Finland
1,626	22,332	911	1,506	15	677										France
6,868	98,476	6,841	15,661	16	380			3	\$2,405	1	1,193				Germany
115	1,325	106	217												Gibraltar
1,020	12,194	564	1,437							2	2,297				Greece
167	2,157	250	606												Hungary
16	212	16	40												Iceland
12,612	141,326	5,965	21,943	73	2,335					5	6,300				Italy
197	3,113	172	403												Latvia
															Lithuania
4,896	67,432	3,722	8,175			9	3,762	7	4,598			2	\$576		Malta, Gozo and Cyprus Is.
3,265	59,242	2,722	6,606	5	106	16	7,628								Netherlands
4,449	57,602	3,739	8,706			99	41,130	20	17,458	10	11,020				Norway
1,903	25,687	1,062	8,450												Poland and Dantzig
8,133	90,078	4,653	9,363	4	132	115	44,315								Portugal
58	769	86	160							3	3,686	50	17,897		Rumania
8,700	116,262	3,847	10,544	39	2,310					1	1,195				Russia
12,282	154,051	8,985	18,247	11	669					1	1,501				Spain
2,653	37,875	2,271	5,077												Sweden
7,842	82,423	5,152	13,062	123	1,548	245	72,671	182	114,673	111	139,398			106	Switzerland
88	1,580	338	3,440	12	163									5,604	United Kingdom
305	2,960	212	360							2	2,296				Irish Free State
						16	3,615	5	3,512					6,965	Yugoslavia
2	20			4	183							1	372	130	United States
1,892	19,145	5,851	7,149	108	3,962										British Honduras
805	14,782	746	1,996	136	2,754	5	2,271			2	2,221	4	1,432	102	Canada
709	12,903	648	1,776			2	850			3	3,440	12	4,296	29	Costa Rica
131	2,138	161	344	20	1,222	1	460								Guatemala
179	3,179	168	464												Honduras
1,191	15,321	1,324	2,427	46	1,681										Nicaragua
264	4,734	198	527	52	3,173					2	1,043	2	2,396	2	Panama
11,443	119,892	5,616	10,418	34	1,295										Salvador
216	2,615	205	375			5	1,740	5	3,000	1	1,145			923	Mexico
242	3,883	118	256	12	310	3	1,227	4	2,653			6	2,317	46	Newfoundland
26	387	37	125	55	1,717	37	13,974	12	9,608	2	2,240	60	21,742	143	Barbados
8	187	3	6			12	4,671	12	7,437	1	1,170	6	2,281		Jamaica
45	543	52	91			9	3,610	3	1,927			2	745	24	Trinidad and Tobago
13,164	121,601	10,588	16,902	681	21,668					3	3,504				Other British West Indies
1,119	20,829	935	2,900	12	613										Cuba
396	5,680	365	685	16	932										Dominican Republic
		14	24	2	105										Dutch West Indies
															French West Indies
250	4,713	516	925			11	3,905	2	1,725			6	2,148		Haiti
102	1,669	79	193	10	414							8	2,712		Virgin Islands
10,828	151,986	10,062	29,260	538	15,785	336	127,060	3	2,630	26	31,007			672	Argentina
32	484	20	59			3	1,198	5	2,620			2	725		Bolivia
6,372	62,146	3,236	6,390	186	5,808	50	19,178	5	4,638	15	16,412			42	Brazil
3,930	58,612	3,193	6,814	169	11,761	141	53,152	21	11,205	6	7,231	108	41,023	18	Chile
3,577	65,421	3,537	9,645	77	3,742	5	1,877	2	1,089	18	22,014			475	Colombia
304	5,013	93	252			3	1,173			1	1,523	8	2,997		Ecuador
						9	3,453	2	1,034			6	2,281	64	British Guiana
															Dutch Guiana
209	2,540	82	230												Paraguay
2,531	45,173	1,316	4,035	53	2,608	77	30,070	4	3,519	2	2,502	10	3,579		Peru
1,942	22,118			45	1,505										Uruguay
1,681	30,000	927	2,478	1	135	17	6,396	3	1,509	6	6,880	96	34,800	54	Venezuela
						16	5,530							75	Aden
4,671	65,154	1,723	3,873	269	5,565	523	198,008	64	50,233	6	7,216	656	232,318	29,128	British India
386	8,348	287	1,067	30	2,099	81	30,038	18	14,414	5	5,553	61	21,964	1,322	Ceylon
1,172	8,507	196	423			219	78,286					33	11,410	9,326	Straits Settlements
1,784	22,691	1,610	3,367	65	1,615	39	15,399							42	China
1,147	11,567	634	1,004	53	1,628										Java and Madura
388	5,055	370	860			288	102,500	2	1,948	27	33,915	9	2,647	12,084	Other Dutch East Indies
50	538	1,740	5,164												French Indo-China
30	257	30	45			6	2,319								Hejaz, Arabia and Iraq
12	165					4	1,145	7	5,963			2	576	83	Hongkong
5,312	51,433	4,887	8,202	643	12,595										Japan
80	580	80	120												Kwantung
2,264	30,935	1,310	2,732			10	3,795			3	3,445	14	5,012		Palestine and Syria
232	6,767	192	767			1	387					10	3,909	83	Persia
4,744	63,309	3,777	8,418	106	2,820										Philippine Islands
															Russia
256	2,151											8	3,081	4,353	Siam
991	9,719	928	3,095	24	1,265										Turkey
2,054	39,050	701	1,661	437	24,315	589	183,289	121	63,614			40	10,843	36,701	Australia
767	9,714	500	3,046	52	2,836	50	22,743	71	43,862			5	1,794	9,687	New Zealand
17	140	8	11												British Oceania
9	119	2	10												French Oceania
															Other Oceania
2	53					10	3,565					5	1,902	476	Belgian Congo
684	14,873	685	4,089			8	3,282								British West Africa
1,124	14,792	149	467	31	968	80	28,837	1	512			22	7,980		British South Africa
477	7,551	482	867			269	101,823	23	13,051	7	7,405	108	37,307	884	Other Africa
307	5,751	163	441	15	1,771	62	21,843	18	11,550			55	19,727	14,619	British East Africa
1,031	9,452	761	1,716	39	1,492	2	784					76	29,836	1,367	Canary Islands
25	375	25	63			61	25,356			1	1,496	46	17,180	297	Egypt
108	1,676	140	354												Algeria and Tunis
20	168	40	68												Other French Africa
7	127	5	17									10	3,627	7	Italian Africa
												2	717		Libya
												4	1,451		Madagascar
785															

AUTOMOTIVE **NEWS SECTION** INDUSTRIES

Philadelphia, Pennsylvania

July 21, 1928

Presentations of New Cars Brings Large Sales Volume

PHILADELPHIA, July 21—Large volume orders for new automobiles placed on the market in recent weeks gives indication of a large potential business which has been deferred pending the appearance of the new cars. Buying developed by the cars now in salesrooms promises to maintain factories producing them at capacity for at least several months. With the appearance later this month of several other important lines a very strong summer sales movement will be under way.

The satisfactory condition of dealer used car stocks makes possible the promotion of new car sales on larger basis than usual during the summer months. Ordinarily dealers are occupied mainly during the summer in clearing up used car stocks in anticipation of fall new car business. This year the new car sales records of the spring and early summer have been accompanied by a more even movement of used cars, resulting only in limited stocks at any time in the past two months.

Factory operations generally are at an improved rate for the season and the effect of continued fair production is serving to maintain a better rate of operation in many contributing industries. Throughout the industry there is generally good production, the lower price classes in which there are no new models scheduled being favored by a lessening of the hesitation due to presidential year caution.

Production in Half Placed at 2,336,687

NEW YORK, July 19—Production for the entire automotive industry in the United States and Canada during June was approximately 435,000, according to figures announced today by the directors of the National Automobile Chamber of Commerce. This compares with 341,168 for June in 1927 and with 459,932 for May of this year. This brings the production for the second quarter of the current year to 1,329,361 as compared with 1,200,368 for the corresponding quarter last year.

Production for the first half of the current year is thus made 2,336,687 as compared with 2,190,155 for the first half of 1927, and with a record figure of 2,483,463 for the first half of 1926.

Raybestos Grants Licenses

BRIDGEPORT, July 19—The Raybestos Co. has granted licenses to the Johns-Manville Co., Multibestos Co., Russell Mfg. Co., and the Manhattan Rubber Mfg. Co. to manufacture, under Raybestos patents, molded and homogeneous clutch facings made from material other than woven tape.

Increased Earnings Shown in Reports

NEW YORK, July 19—Chrysler Corp. reports net earnings of \$11,690,479 after taxes for the first half of 1928. This equals \$3.98 a share on the common stock, and compares with \$10,116,749, or \$3.41 a share, in the first half of 1928. Chrysler earnings in the second quarter totaled \$6,988,013 after taxes, or \$2.41 a share on the common stock, against \$4,702,465, or \$1.57 a share, in the first quarter of this year and \$5,724,180, or \$2.11 a share, in the second quarter last year.

The balance sheet as of June 30 showed current assets of \$58,477,162 and liabilities of \$12,692,530.

Equally good volume and profits are expected during the second half of the year. Stocks of cars in the hands of dealers and distributors and in transit constitute 4.6 weeks' sales, at the present rate of retail delivery, as compared with 6.9 weeks for the corresponding week last year.

Mullins Mfg. Co. for the first half shows net profit of \$433,860 before taxes, equivalent to \$3.96 a share, after preferred dividends, on 100,000 shares of common. This compares with \$278,860 or \$2.41 a share in the same period last year. Net profit for the quarter ended June 30 totaled \$264,667, or \$2.45 a common share, against \$169,193 or \$1.50 a share in the previous quarter and \$128,779 or \$1.09 a share in the June quarter a year ago.

Foundry Earnings Increase

Campbell, Wyant & Cannon Foundry Co. for the six months ended June 30 shows net income of \$901,010 after charges and Federal taxes, equivalent to \$4.30 a share earned on 209,898 shares of no par stock. This compares with \$772,000 or \$3.96 a share in the first half last year.

Edward G. Budd Mfg. Co. for the first six months of the year report earnings after all charges of \$818,000. After provision for dividends on preferred stock the balance was equal to \$2.20 a share on the outstanding common stock.

Ship-Planes to Speed Trans-Atlantic Mail

NEW YORK, July 18—Air mail service which will save from 20 to 36 hours of trans-Atlantic time is to be inaugurated with the next trip of the French liner, *Ile de France*. This steamer has been equipped with a 100-foot runway and compressed air-cata-pult to make it possible for a French amphibian plane to leave the ship while still far out at sea and deliver mail at the termini.

If this procedure works satisfactorily for the delivery of mail, it may be widened in scope and become available for passengers desiring to cut down their time of crossing.

Excise Tax Filing Date Extended to September

WASHINGTON, July 19—An extension of time to automobile manufacturers in filing returns for their excise taxes was announced this week by the Internal Revenue Bureau of the Treasury Department.

Under instructions mailed to collectors this week, manufacturers have until Sept. 29 to file complete and final returns under the excise tax act. Originally manufacturers were given until July 31 to file their complete returns, this time being granted for the purpose of creating a pool which would enable the manufacturers to rebate to the dealers refunds under the tax repeal act. The department announces that there will be no extension beyond Sept. 29 and that all manufacturers must report fully by that date.

Indian Four Announced

SPRINGFIELD, MASS., July 18—The new Indian Four, a redesigned motorcycle to supersede the Indian Ace Four, is ready for the market, Indian Motorcycle Co. announces. This product is said to have an improved engine of Indian design and manufacture and has various Indian features incorporated in it. Low riding position is one of the distinguishing features.

Willys Sails for Europe

John N. Willys, who sailed for Europe the week of July 21, said the "current trend of Overland sales point to a highly satisfactory year. We are steadily increasing and perfecting our distributing organization and the sales volume is showing a steady gain."

Reeves Shows Need for Foreign Aides

Growth of Exports Requires
Full-Time Representatives
Abroad, He Declares

SOUTH BEND, July 19—Commenting on the automobile production figures for the first six months of the current year, Alfred Reeves, general manager of the National Automobile Chamber of Commerce, at the mid-summer directors' meeting here said:

"With markets in other countries demanding from 12 to 18 per cent of the production of cars of American design, the field is becoming of increasing importance. We find that our customers and retailers in other lands feel the need of a closer contact and the decision has been reached to have full time representatives both in Europe and in Latin-America. At the present time, Walton Schmidt is representing the automobile industry in English-speaking countries and John V. Lawrence is touring Latin-America. George F. Bauer leaves for Europe in August. But the traveling representative seldom has as intimate touch with conditions as a resident executive, and this is the next step toward closer unity of transport groups in all countries."

The following directors and factory executives were present at this meeting and were the guests of Mr. Erskine:

Roy D. Chapin, Robert C. Graham, Charles D. Hastings, C. W. Nash, R. E. Olds, Walter C. White, A. R. Erskine, A. J. Brosseau, Alvan Macauley and Fred J. Haynes, N.A.C.C. directors, and E. L. Cord, president, Auburn Automobile Co.; A. R. Glancy, president, Oakland Motor Car Co.; Thomas Henderson of Oberlin, Ohio; Stewart MacDonald, president, Moon Motor Car Co.; M. L. Pulcher, president, Federal Motor Truck Co.; I. J. Reuter, president, Olds Motor Works; G. N. Williams, president, Marmon Motor Car Co.; George F. Rand, president, Marine Trust Co., Buffalo; Walter P. Cooke and Myron E. Forbes, Pierce-Arrow Motor Car Co.; John A. Ritchie, chairman, Yellow Truck & Coach Mfg. Co.; Edward M. Hurley, Studebaker Corp., Chicago; M. H. Pettit, vice-president, Nash Motors; James S. Marvin and Alfred Reeves, N.A.C.C., and William J. McAnee, Hudson Motor Car Co.

Indiana Truck Sales Gain

MARION, IND., July 17—The first six months of 1928 showed an increase of 45 per cent in orders received by the Indiana Truck Corp., over the same period last year. Orders continue to show an increase in July, and all departments are running at capacity.

\$106,000,000 for Road Funds

WASHINGTON, July 19—France expects to spend approximately \$106,000,000 in developing and maintaining

its roads during the coming fiscal year, the Department of Commerce is advised. The highway system of France is made up of 40,000 kilometers of roads. Almost 80 per cent of the amount included in the budget is to be for the purpose of maintaining and repairing existing roads and construction of special automobile roads.

G. J. Connolly Heads Weymann U.S. Plant

INDIANAPOLIS, July 17—G. J. Connolly has been named president of the Weymann American Body Co. of Indianapolis. He joined the Indianapolis factory in May and went to France and England for the inspection tour.

In 1918 Mr. Connolly became associated with the Hupmobile factory as a body designer and later became superintendent of the body plant in Wisconsin. In 1925 he joined the Murray Body Corp. as sales engineer and shortly was appointed chief engineer of the Murray plant in Detroit. He has been in Indianapolis for about a year and a half with the Murray organization, as plant manager.

Since its organization the Stutz Motor Car Co. has taken the entire production of the Indianapolis factory. At the present time, six other automobile factories are making tests of the Weymann bodies, Mr. Connolly reports.

Petroleum Production Up, Imports Show Reduction

NEW YORK, July 18—Average daily crude oil production in the United States, according to the American Petroleum Institute, for the week ended July 14 was 2,391,500 bbl. as compared with 2,383,850 bbl. for the preceding week, an increase of 7650 bbl.

Imports of petroleum at the principal United States ports for the week ended July 14 totaled 1,214,000 bbl., a daily average of 173,429 bbl., compared with 1,989,000 bbl., a daily average of 284,142 bbl. for the week ended July 7, and a daily average of 237,929 bbl. for the four weeks ended July 14.

Bumper Crop in Northwest

SPOKANE, WASH., July 18—Welcome news to Spokane automotive dealers is the optimistic report which has just been made here by A. W. Lindsay, president of the Fidelity National Bank of Spokane, that a \$50,000,000 wheat crop will be harvested from Inland-Empire districts. As Mr. Lindsay is a wheat grower himself his report is a most conservative one.

Plane to Flash Signs

NEW YORK, July 18—A large Keystone biplane known as Sign Carrier No. 1 was christened at Roosevelt Field yesterday. This plane is designed to fly at an altitude of 3000 ft. and will carry illuminated words spelled out in a series of 18 sockets designed to contain any letter in the alphabet.

Business in Brief

Written by the Guaranty Trust
Co., New York, exclusively for
AUTOMOTIVE INDUSTRIES.

NEW YORK, July 19—Business in general is under the influence of mid-summer dullness, but retail trade has been stimulated by warm weather, which has also been beneficial to crops. Wholesale dealers likewise report better orders in those sections where crop conditions have improved.

FREIGHT CAR LOADINGS

The volume of railway freight continues to run below the figures a year ago. During the week ended June 30 car loadings numbered 1,003,049, which compares with 986,789 in the preceding week and 1,021,438 in the corresponding period last year. During the first half of the year 24,457,105 cars were loaded, as against 25,521,040 cars in the similar period of 1927 and 25,333,232 cars two years ago.

BANK DEBITS

Bank debits to individual accounts outside of New York City were 10 per cent larger during the week ended July 11 than a year earlier.

FOREIGN TRADE

Exports of commodities last month were \$33,000,000 larger than in June, 1927, while imports were \$38,000,000 smaller, leaving a surplus of exports \$71,000,000 larger than a year earlier. For the fiscal year, however, the export surplus shows a gain of only \$14,000,000, the result of declines of \$90,000,000 in exports and \$104,000,000 in imports.

POWER CONSUMPTION

General industrial activity in June, as measured by industrial consumption of electricity reported to the Electrical World, was 3.5 per cent larger than in June last year and showed less than the usual seasonal decline from the May level. The same trend is indicated by industrial employment, which increased fractionally in June, contrary to the usual seasonal movement.

FEDERAL RESERVE REPORT

The chief development in financial markets last week was the advance in Federal Reserve rediscount rates from 4½ to 5 per cent, begun by the Federal Reserve Bank of Chicago and quickly adopted by several other institutions including the Reserve Bank at New York City.

The advance was followed by a severe break in stock prices, one of the most pronounced daily reactions in the history of the Stock Exchange. The decline, however, was checked in the latter part of the week.

The week ended July 11 was one of general contraction in bank credit. Discounts of the Federal Reserve banks declined \$102,000,000 and the reserve ratio rose from 65.4 to 67.9 per cent. Loans of reporting member banks decreased \$252,000,000, net demand deposits \$236,000,000 and loans to brokers in New York City \$64,000,000.

Industry Continuing Active Steel Buyer

Orders Are Kept to Minimum
But Aggregate is High—
Prices Steady

NEW YORK, July 19—Volume of steel demand is fairly well maintained. In the Mahoning Valley Ford buying is emphasized by way of explaining the relatively high rate at which sheet mills are operating, but there are indications that other automotive interests are just as active on the buying side of the market. No very large orders are coming out at any one time, but while some motor car manufacturers and parts makers keep individual specifications down to their immediate minimum requirements, the automotive industries as a whole continue consistent steel buyers and purchases in the aggregate make a splendid showing for the year's dull period.

Prices do not come in for as much discussion as one would expect. There is an absence of pressure on market prices by buyers and what price changes occur, such as a recent \$2 per ton decline in wire products, represent largely downward revision following long-continued whittling of prices among competing mills. Bar mills are still striving to establish 1.90 cent, Pittsburgh, as the third quarter price for the hot-rolled product, but inasmuch as numerous large consumers have been permitted to extend their second-quarter arrangements at lower prices, the advance is generally looked upon as having fallen. Carnegie has advanced steel bars \$2 a ton.

Routine orders for cold-finished steel bars continue to be placed by automotive consumers at 2.10 cents, Pittsburgh. The market for automotive alloy steels is steady, with demand on the uptrend. The market for sheet bars appears to have finally settled on a \$32, Pittsburgh, basis, and non-integrated sheet rollers fare more uniformly in the purchase of their semifinished material than was the case a few months ago. Full-finished automobile sheets rule firm at 4.00 cents, Pittsburgh. While the black sheet market continues at 2.65 cents, Pittsburgh, \$1 or \$2 a ton higher prices are obtained for special finishes, aside from the extras. Blue annealed sheets continue to be quoted at 2.00 cents, Pittsburgh, but here and there, in competition with strip mills, this price is shaded.

Pig Iron—Automotive foundries are slow in coming into the market for third quarter iron, many still having good-sized tonnage due them on second quarter contracts that have been carried over. The Michigan market is steady at \$17.50. Valley iron is quoted at \$16.50 @ \$16.75, Valley furnace.

Aluminum—New York aluminum importers doubt the accuracy of press reports that a price-cutting war between the American producer and the European cartel has actually broken out. They point

out that home consumption of the metal in Germany has increased by leaps and bounds, and that German producers, in view of higher copper prices, face the task of supplying a steadily rising demand for aluminum as a substitute for American copper. German metal papers, however, have for some time intimated that an international price war was in the offing. Russia is building a 10,000 ton (a year) plant, and another is projected for Hungary. The market here is entirely unchanged.

Copper—Consumers are in no hurry to contract for August deliveries. The market continues at 14¼ cents delivered Connecticut, and 14¼ to 14½ cents delivered Middle West.

Tin—The market has turned a shade steadier and appears to be headed for slow recovery.

Lead—Demand is fair, the market's tone being steady.

Zinc—Producers have broadened the scope of their organization along the lines of the Copper Institute. The market is quiet and steady.

Pierce-Arrow Lowers Prices on 81 Series

BUFFALO, July 14—Price reductions ranging as high as \$600 on its Series 81 cars were announced today by Pierce-Arrow Motor Car Co. The reduction will establish a group of factory prices which range as low as \$2,475 for one of the five-passenger closed models. This move brings Pierce-Arrow prices to the lowest in history and is in accordance with a policy of increasing sales volume by a material expansion of its market. Price changes in the individual models are as follows:

Seven-passenger enclosed drive limousine, reduced from \$3,550 to \$2,950; seven-passenger sedan, reduced from \$3,450 to \$2,850; convertible coupe, reduced from \$3,450 to \$2,950; four-passenger coupe, reduced from \$3,450 to \$2,950; five-passenger sedan, reduced from \$3,350 to \$2,750; two-passenger coupe, reduced from \$3,350 to \$2,750; four-passenger touring, reduced from \$3,100 to \$2,700; runabout, reduced from \$2,900 to \$2,600, and five-passenger club brougham, reduced from \$2,750 to \$2,475.

Will Adds to Factory

MINNEAPOLIS, July 16—The C. H. Will Motor Corp. will erect an addition to be ready in 90 days which will double the factory floor space. One part of the addition will be a service department of 15,000 sq. ft. area, facing two streets. Another building will be for storage. The improvements will cost \$85,000. The company makes W.M.C. trucks and buses.

Smith Bearing Expands

CHICAGO, July 16—L. C. Smith Bearings Co., has purchased the property at 2633-35 So. Michigan Ave. for \$100,000. The machine shop, and tool and equipment departments will be enlarged when the company occupies the new building.

Willys to Continue Pace of First Half

Output of 200,000 in Early
Year Brings Company Be-
yond 2,000,000 Mark

TOLEDO, July 16—Willys-Overland Co. produced its 2,000,000th car July 2. The past six months has seen the greatest production in the history of the company. It has exceeded the yearly production of every year except two.

John N. Willys, in connection with the company reaching the 2,000,000 mark said, "We are in the midst of the most successful year in the history of the Willys-Overland company. Present indications, from orders on hand, and from the general conditions existing among our dealers, old and new, are that the organization will go through the remaining six months at a pace comparable with the first half-year. The Whippet has justified every expectation we had when it was introduced in June, 1926. Present models are a duplicate of the original production, with minor improvements in body design, and will continue to be built to their present specifications. The Willys-Knight models have steadily increased in popularity and have responded to the widening range of prices which have been made possible by the development of our manufacturing facilities."

Dodge First-Half 121,327, Sees Gain in Last Half

DETROIT, July 14—Dodge Brothers, Inc., shipped 121,327 units during the first six months this year. This compares with 107,115 units in the 1927 period, an increase of 14,212 units. At the same time stocks in dealers' hands on July 1 were lower than on Jan. 1.

Export shipments show a gain of 17.9 per cent over the corresponding months in 1927. June exports showed a 79 per cent increase over June last year.

The company starts on the last half of the year producing all of its newly completed passenger cars, trucks and motor coaches. The company expects that the final six months production will surpass that of the first.

Apollo Perfects Process

CHICAGO, July 17—The Apollo Metal Works, La Salle, this state, has perfected a process of manufacturing chromium plate that has been converted into commercial form. The company's product is available for immediate fabrication without plating.

Martin-Parry Adds Space

TOLEDO, July 17—Martin-Parry Corp. has taken additional space in the former Bock Bearing Co. plant here and will furnish truck bodies for Willys-Overland Co. and will aid the Pennsylvania and Indiana plants in meeting body demand.

Dura Starts Work on \$1,000,000 Plant

Will Centralize Operations
Now Conducted in 4 Plants
in Toledo District

TOLEDO, July 16—The Dura Co., maker of window regulators and body hardware, has begun the building of a new plant on a 15-acre site. Investment in the plant and equipment will be more than \$1,000,000. The new plant will centralize the working forces in four local plants operated by the company. It will also enable about 500 more workers to be added to the force, bringing it up to 1500 employees.

So far this year the company has manufactured window regulators for 1,000,000 automobiles, about 20,000,000 pieces of decorative hardware and more than 4,000,000 ft. of channel shapes for body moldings for the automotive trade. Nearly 30 important car builders use Dura products. The company is also entering into production of airplane parts in a small way.

The new plant will be 266 ft. wide and 516 ft. long, with a portion two stories high, giving in all 165,000 sq. ft. of floor space. Plenty of space is available for trebling the size of the plant in the future if required.

The Dura Co. has been incorporated under Ohio laws with 25,000 shares no par common and \$200,000 preferred and the Dura Building Co. has been incorporated also with same officers to aid in financing of the new plant.

Horace H. Buggie is president; Frank Suydam and R. C. McCullough, vice-presidents; F. E. Bowker, vice-president and general manager; Otto Marx, secretary, and Horace Suydam, treasurer. Officers, together with Frank Stuart Lewis, form the directorate.

The plant is to be completed in less than five months.

Westinghouse Opens Station

PITTSBURGH, July 16—Westinghouse Air Brake Co. has opened one of the largest exclusive brake service stations in the country here. Three floors of a large building are devoted entirely to adjusting, relining, regrinding and testing all types of motor car brakes. A built-in electrical testing machine is an outstanding feature of the equipment.

Charles A. Chevrax

CANTON, OHIO, July 16—Charles A. Chevrax, secretary and general manager of the Massillon Rivet & Mfg. Co., died July 6, from injuries received while inspecting machinery in the plant. This company is the successor of the Canton Bolt Co. Mr. Chevrax had been connected with the Cleveland-Canton Spring Co., Jenkins Vulcan Spring Co., and the Beans Spring Co., and was a member of the Society of Automotive Engineers.

Combine to Handle Aircraft Insurance

NEW YORK, July 16—Definite action toward the writing of aircraft insurance was taken by the formation of the United States Aircraft Insurance Group, consisting of four fire insurance companies and four casualty insurance companies. These companies will pool their facilities and each fire company will carry a share of the insurance written on each aircraft, while each casualty company will carry a share of all liability, accident and compensation risks accepted by the managers. The group will commence underwriting on Aug. 1 through United States Aviation Underwriters, Inc.

Auburn Sets 12 Records in 2000 Mile Track Test

WASHINGTON, July 16—The establishment by Auburn of 12 new speed records for fully equipped open stock cars was officially announced today by the American Automobile Association. The run was made by two Model 115 speedsters on the Atlantic City Motor Speedway at Amatol, N. J., on June 30 and July 1. The records are as follows:

Distances	New	
	Former Record	Auburn Record
	m.p.h.	m.p.h.
5 miles	80.454	85.4985
10 "	80.694	85.8656
50 "	80.562	86.1302
100 "	81.103	86.2688
500 "	79.614	84.5501
1000 "	75.365	84.8252
2000 "	73.349	84.6967
Periods in Hours		
1	81.101	85.5932
3	80.391	84.5080
6	79.409	84.5796
12	75.136	84.8606
24	75.623	84.7354

Ships Use Automotive Equipment

CHICAGO, July 16—The two new \$40,000,000 aircraft carriers, Saratoga and Lexington, are equipped for servicing, overhauling and rebuilding airplanes, in addition to being floating flying fields. This equipment, with much of the flying materials and equipment, was acquired largely from automotive sources. Joseph Weidenhoff, Inc., made much of the electrical equipment.

Budd Gets Large Contract

PHILADELPHIA, July 16—Edward G. Budd Mfg. Co. reports the booking of an order for steel stampings for one of the larger automobile companies approximating \$500,000 a month. Deliveries are to begin early this fall. The company announces this order is additional to its regular line of business.

Chrysler Rearranges Factory Facilities

Plans Plymouth and De Soto at
Highland Park and Chrysler
at Jefferson Plant

DETROIT, July 17—Chrysler Corp. is making extensive plant alterations and additions to provide production facilities for the De Soto Motor Corp., a division of the Chrysler Corp.

Production of the Chrysler 65 is being removed from the Highland Park plant to the Jefferson Avenue plant which has been greatly enlarged and where it will be completely installed by Oct. 1. After that date all Chrysler 65, 75 and 80 models will be produced at the Jefferson Avenue plant, leaving the mammoth Highland Park plant for the Chrysler Plymouth and the new De Soto.

J. E. Fields, president of De Soto, stated that all the space heretofore devoted to the Chrysler 65 at Highland Park will hereafter be devoted to the De Soto production. As demand for De Soto increases, production facilities will be likewise stepped up.

According to C. W. Matheson, vice-president in charge of sales of De Soto, 2000 De Sotos will be produced in July. The company expects to make 5000 in August and 7500 in September and thereafter production will be guided by demand.

Mr. Matheson said the De Soto Motor Corp. set out to seek 700 direct and 2800 associate dealers. Saturday night the company had 460 direct dealers and each of these has obtained approximately four associate dealers. He reports his company has approximately 5000 applications on file for associate dealers, and he expects the entire De Soto dealer organization will be completed in September or October.

Dodge Brothers Holders Get July 23 for Filing

NEW YORK, July 16—Further extension of time for the deposit of Dodge Brothers stocks for the consummation of the Chrysler-Dodge merger has been made, due to the fact that the 90 per cent deposit specified by Mr. Chrysler was not made on July 10. The new date set is as of the close of business on July 23.

Deposits made up to July 10 amounted to 84.2 per cent of the preferred stock, 76.6 per cent of Class A common and 96.9 per cent of Class B common.

The notice of the committee to depositors and stockholders refers to the litigation begun here by non-assenting holders of preference shares to prevent the carrying out of the plan.

In view of a possible conflict, the committee now offers holders of such stock who have deposited their shares a formal opportunity to withdraw but calls attention to the fact that the plan cannot be carried out if such rights are exercised.

Men of the Industry and What They Are Doing

Chamberlain to Direct A.E.A. Marketing Plan

A continuous record of long service and wide experience in the field of automotive merchandising is brought to his new post by Percy E. Chamberlain, just appointed as managing director of the Greater Market Development department of the Automotive Equipment Association.

Among Mr. Chamberlain's outstanding contributions to increased sales in the after-market was the plan of Flat Rates. He was also one of the originators and organizers of the National Automobile Dealers' Association, serving on its first directorate and thereafter for a term of three years. He is also a past president of the Denver Auto Trades Association.

Prior to his appointment as managing director of the Greater Market Development department, Mr. Chamberlain was assistant to Harry G. Moock, resigned, and was active in the formulation and development of the various campaigns and activities of the department which now will be in part the basis for the department's program during the summer and autumn.

A.C.F. Board Reelected

American Car & Foundry Co. at its annual meeting in Jersey City reelected the board of directors, consisting of the following members: William H. Woodin, C. R. Woodin, John Sherman Hoyt, Dallas B. Pratt, William M. Hager, Charles J. Hardy, W. C. Dickerman, Herbert W. Wolff and G. R. Scanland.

Yellow Truck Adds Directors

Yellow Truck & Coach Mfg. Co. has increased its directorate from 11 to 15 members. The following additional directors have been named: G. A. Green, P. H. Geyser, L. Ruhenberg and H. J. Warner, all officials of the company.

Bolles Heads Standards

Automotive Standards, Inc., has elected Norman T. Bolles as president and chairman of the board; Merwyn C. Fry as vice-president. F. W. Barhoff, president of the Hartford Battery Mfg. Co., and Major Ralph W. Appleton, president of the Century Engineering Corp., were elected directors.

Vane and Small Speak

C. A. Vane, secretary of the National Automobile Dealers Association and Ray A. Small, automotive engineer, delivered the principal addresses at the first summer meeting of the Minnesota Motor Trades Association, ended July 14. Mr. Small devoted his attention to developments in the industry, citing the Indianapolis races as a great factor from the mechanical viewpoint.

Ex-Factory Men Now Studebaker Dealers

GUY P. HENRY, for 27 years an employee of the Studebaker factory and former manager of one of the corporation's larger plants, is president and manager of Henry Motor Sales Co., Studebaker dealer at High Point, N. C. For eight years Mr. Henry was chief engineer of Studebaker Corp., then retired, but again, after a lapse of some time, has reentered the automotive trade. William P. Schillington, for 10 years assistant treasurer of the Studebaker Corp., and later for some years assistant to the president, is treasurer of the company. John W. Henry, formerly a regional sales manager of Studebaker and brother of Guy P. Henry, is sales manager.

Rymarczick Now Distributor

G. Rymarczick has resigned as assistant sales manager of the automotive division of the American Bosch Magneto Corp. to become president and general manager of the Plymouth Motor Service Co., western Massachusetts distributor of Bosch products with headquarters in Springfield. Mr. Rymarczick was with the old Bosch company from 1911 to 1917 and has been with American Bosch for six years. In this new post he succeeds Harry Wilson, who goes to Chicago.

Blaney Service Manager

L. H. Blaney has been appointed factory service manager for Larrabee Deyo Motor Truck Co. For the past two years Mr. Blaney has been assistant general manager of the Larrabee factory branch at Albany. Previous to that he was general manager of Wright Motors of Albany. Mr. Blaney has been in the truck business since 1913.

Lynn Represents Belden

Wallace R. Lynn, with offices in San Francisco, has been appointed Pacific Coast representative of Belden Mfg. Co., Chicago. Mr. Lynn will handle the automotive, electrical and radio lines which are merchandised exclusively through jobbers and dealers.

Beeching Goes to Omaha

Charles G. Beeching, district supervisor in the Louisville territory for Hudson Motor Car Co., has been transferred to Omaha, Neb., and Tom G. Daley, manager of the Cincinnati division, will supervise operation of that office as well as the Louisville office.

General Electric Elects Three Honorary Officers

Directors of General Electric Co. have elected three prominent officials honorary vice-presidents. They are J. R. Lovejoy, vice-president, who has served the company 42 years; George F. Morison, vice-president, associated with the company 45 years, and B. G. Tremaine, one of the organizers of the National Lamp Division of General Electric Co. All three are directors of the company and will continue to function as such, and will retain their association with the several departments.

T. W. Frech, manager of the incandescent lamp department of the company, was elected vice-president in charge of the incandescent lamp department, and Dr. W. R. Whitney, director of the research laboratory, was elected a vice-president of the company and director of research.

Austin Joins Defiance

Paul W. Austin, for five years a member of the advertising firm of Charles F. Dowd, Inc., here, has become assistant sales manager of the Defiance Spark Plugs, Inc. He has been associated with the advertising of the company for several years.

Novosielski Joins Eclipse

Edward B. Novosielski, formerly chief engineer of the Splittorf Electrical Co., of Newark, N. J., is now assistant chief engineer of the Eclipse Machine Co., East Orange, N. J., in charge of development work.

M. M. Titterington

NEW YORK, July 16—Morris M. Titterington, vice-president and chief engineer of the Pioneer Instrument Co., Brooklyn, was killed in an airplane crash this week in the mountains of eastern Pennsylvania. Mr. Titterington had been identified with the aeronautic industry for 14 years, serving with Curtiss Aeroplane & Motor Co., Inc., and the Sperry Gyroscope Co. before organizing in 1920 the Pioneer Company with C. H. Colvin and Bryce Goldsborough. He was a member of the Society of Automotive Engineers and the American Society of Mechanical Engineers.

Joseph A. Steinmetz

PHILADELPHIA, June 14—Joseph A. Steinmetz, widely known in the automotive and aeronautic industries for his inventions, died here this week after a long illness. He was a member of the firm of Janney, Steinmetz & Co., this city, and held membership in the Society of Automotive Engineers and the Motor & Accessory Manufacturers Association.

May Rubber Exports 56 Per Cent Tires

Automotive Rubber Shipments in Month Run 8 Per Cent Below April

WASHINGTON, July 19—More than 56 per cent of the value of total rubber products exported from the United States during May were automotive rubber goods, including casings, tubes, solid tires and tire repair materials, according to revised figures of the rubber division of the Department of Commerce just issued. The United States exported a total value of \$5,986,732 rubber products, of which automotive rubber goods amounted to \$3,387,351.

May exports were 8 per cent less than April but unit values were higher, the average price being \$12.80 per unit of May exports as against \$12.32 in April.

Cuba was the principal market for automobile casings by quantity, although it was a low price market from the unit value standpoint, the average unit price being \$9.24. Italy was the next best outlet for casings.

V.E.P. Varnish to Move Headquarters to Pontiac

PONTIAC, July 13—The V. E. P. Varnish & Enamel Products Co. has started operations in a new branch in Pontiac. The Pontiac unit which is said to be the largest of three operated by the V.E.P. interests is located in the factory formerly occupied by Arthur Dove & Co. The other two units are in St. Louis and Newark.

Headquarters of the company are being moved to Pontiac, according to M. F. Geserich, president and general manager. A. B. Hogan will be assistant manager of the Pontiac plant and E. H. Walker is being transferred from the St. Louis branch to be superintendent.

Output of the V.E.P. company and affiliated companies, with the starting of production of its third plant at Pontiac, is expected to exceed \$5,000,000 annually.

Butcher Vice-President

PHILADELPHIA, July 18—The directors of the Edward G. Budd Mfg. Co. have amended the by-laws of the company by creating the office of second vice-president. Harold E. Butcher, formerly vice-president of Champion Spark Plug Co., was elected to the new office. The membership of the board of directors was increased from 12 to 15.

French Company Formed to Finance Time Sales

PARIS, July 16—The Societe de Credit a l'Industrie Automobile, controlled by Andre Citroen Motors, will increase its capital from 20,000,000 to 50,000,000 francs. A new corporation, "Societe for Development of Sales on

Credit," will be formed for the purpose of financing instalment sales, not only of Andre Citroen motor cars, but of all other goods as well. The new corporation will be formed by a financial group headed by Lazard Co. of Paris and of the Commercial Investment Trust of New York. The president of the latter will join the board of directors of the French corporation.

Nash Schedules 60,000 to Meet Summer Sales

KENOSHA, July 14—Retail orders for July delivery of 25,000 new 400 series cars, the biggest month in the company's history, are on the books of Nash Motors Co. and the number is increasing daily, it was announced at the factory this week.

This demand has set a new high mark for Nash sales and has resulted in a production schedule which calls for manufacture of 60,000 cars in July, August and September.

Campbell-Ewald Agency Opens Lansing Branch

LANSING, July 11—The Campbell-Ewald Co. has opened a branch office here in the new Mutual building. M. A. Hollinshead, account executive for more than six years, will have charge of the office. Previous to coming with Campbell-Ewald, Mr. Hollinshead was advertising manager of the Studebaker Corp. and of the Saxon Motor Co.

The Lansing office has been opened primarily to take care of the expanding business of Oldsmobile and will also service other Campbell-Ewald clients and interests in the central Michigan district.

Test Avro Planes Here

NEW YORK, July 17—Test flights were made yesterday at Curtiss field for one of two Avro Avian folding wing sport model biplanes, equipped with Handley-Page slots received recently by the Air Associates, Inc. The new plane is the first of this type constructed by A. V. Roe, Ltd., Manchester, England, to be flown in this country.

Brile Fairmont President

FAIRMONT, W. VA., July 16—Fairmont Mfg. Co., at the last meeting of the board of directors, elected Lawrence M. Brile president to succeed W. J. Adam, resigned. Robert J. Anderson was elected vice-president, John N. Brenza was made sales manager, and T. A. Lynch was appointed assistant to the president.

Lycoming Has Record June

WILLIAMSPORT, PA., July 18—With new contracts for engines from several automobile companies on hand and with an increased demand from regular customers, Lycoming Mfg. Co. has experienced the greatest June production in its history. The plant is now operating in many of its departments on a 24-hour basis. More than 2000 men are employed.

Financial Notes

Graham-Paige Motors Corp. and subsidiaries report net income for the first half of the current year as \$1,878,502 after all charges. This compares with \$1,426,463 for the corresponding period last year made by the predecessor company, Paige-Detroit Motor Car Co. This is equivalent to \$1.59 a share on outstanding common stock. The bulk of this profit was made during the second quarter of the current year, for which the net income was \$1,620,719, or \$1.44 a share, as compared with \$257,783, or 15 cents a share, for the first quarter.

Stutz Motor Car Co. of America, Inc., reports net profit for the first six months of 1928 was \$440,935, equivalent to \$1.90 per share. This compares with \$123,024 or 53 cents a share in the same period of 1927. Both figures are before Federal taxes, but after all charges. Shipping orders now on file indicate that the output will continue at a high rate for the next three months at least. Part of the increase in earnings for the first half of the year is attributed by Stutz to a marked gain in export business.

Ross Gear & Tool Co. reports net earnings for the first half year at \$373,961, compared with \$245,545 for the same period last year. Net earnings per share are \$2.49 as against \$1.64 for the period last year. All the preferred stock of the company was retired on June 30, out of cash on hand, clearing up all outstanding indebtedness.

Hupp Motor Car Corp. reports for quarter ended June 30, 1928, net profit of \$2,667,693 after depreciation and Federal taxes, equivalent to \$2.58 a share earned on the 1,030,319 shares of stock. Net profit for first six months of 1928 totaled \$4,283,221 after above charges, equal to \$4.15 a share, against \$1,147,722 or \$1.14 a share in the first half.

General Electric Co. sales billed for the first half of 1928 amounted to \$158,015,221 as compared with \$149,795,027 for the corresponding period a year ago. Profit available for dividends on common stock was \$24,388,002, or the equivalent of \$3.33 a share, and compares with \$22,542,972 or \$3.13 a share, last year.

Bohn Aluminum & Brass Corp. reports net profit for the six months ended June 30 as \$1,644,089 after all charges and taxes. This is equivalent to \$4.70 a share and compares with net profit of \$603,163, or \$1.73 a share for the corresponding period a year ago.

Allis-Chalmers Mfg. Co. has advanced its annual dividend rate on common stock from \$6 to \$7 by the announcement of a quarterly dividend of \$1.75 payable August 15 to stockholders of record July 14.

Servel, Inc., reports operating profit of \$380,976 for the second quarter before bond interest and Federal taxes. The same quarter last year showed \$379,962.

Martin Parry Corp. net income for the quarter ended May 31, was \$26,705 after interest and other charges, but before Federal taxes.

Checker Cab Mfg. Corp. reports net income for the month of June before non-recurring charges for reserves as \$88,618.

Ohio Cities Show June Sales Lower

Decline of About 10 Per Cent
From May Reported
by N.A.D.A.

COLUMBUS, July 16—The Ohio Council, National Automobile Dealers' Association, in its report covering sales of new passenger cars in nine of the larger counties of Ohio, shows a decline of about 10 per cent in new car sales in June, compared with the previous month. The percentage of decrease is about the same in practically all counties excepting Montgomery, containing Dayton, where there was an increase of 25 per cent in new car sales in June, over May.

In all there were 13,176 new cars sold in the nine counties in June, compared with 14,661 in May.

By counties the June sales of new cars were: Cuyahoga, containing Cleveland, 4402 against 4871 in May; Hamilton, containing Cincinnati, 1650 against 1975; Summit, containing Akron, 1431 against 1601; Lucas, containing Toledo, 1435 against 1746; Franklin, containing Columbus, 1329 against 1375; Mahoning, containing Youngstown, 788 against 930; Stark, containing Canton, 853 against 1065; Scioto, containing Portsmouth, 234 against 250; May and Montgomery, containing Dayton, 1054 against 848.

Columbus Plant Resumes

COLUMBUS, June 14—The Columbus assembling plant of Ford Motor Co., which has been idle for the past 13 months, started operations July 12 with approximately 200 men in the mechanical departments. General Manager Louis S. Petit announced that additional men would be put on until the full capacity of the plant is reached. The initial production will range from 25 to 30 cars daily. The full capacity of the plant is approximately 280 cars daily.

N. Y. Sales 77,572 in Half

NEW YORK, July 16—Sales of new cars in the metropolitan district in June totaled 13,851, comparing with 18,311 in May and with 11,766 in June, last year. The total for the six months was 77,572 against 62,383 in 1927 and 68,611 in 1926, the previous high.

Employed 11,063 in 1927

WASHINGTON, July 19—Canadian automobile plants employed 11,063 persons in 1927, according to the Department of Labor. The combined wages and salaries total \$18,862,846 for the year.

Chicago Ford Plant Starts

CHICAGO, July 14—The Ford assembly plant here with a capacity of 280 cars a day, has opened after being idle 13 months. The plant will operate with a force of 200 men at first, producing 20 to 30 cars a day.

Mexicans Approve American Road Plan

WASHINGTON, July 19—A highway from Tampico, Mexico, to Victoria, on the Texas border, is provided for in legislation passed by the State of Tamaulipas, Mexico, the Department of Commerce announces. Plans for the first section of the road, prepared as a result of surveys made by the road committee of the American chamber of commerce and submitted to the governor of the state of Tamaulipas, have already been approved by the governor.

Carter Sales and Service Divided in 4 Territories

ST. LOUIS, July 16—Carter Carbu-retor Corp. has reorganized its sales and service organization into four sales territories, and three service territories. The Eastern sales district is Maine to Florida, inclusive, with John J. Machecek as manager, with offices at the New York branch. The East Central district is Ohio, Michigan and Indiana to Alabama and Louisiana, inclusive. Lester Lowenstein is district manager with headquarters in St. Louis. The West Central district is the territory bounded by the states of Montana, North Dakota, Minnesota, Wisconsin, on the north, and Texas on the south. Ralph C. Richards, traveling out of St. Louis, is manager. The Western district, including the Mountain States and the Pacific Coast, are under Carl H. Yackey, manager, with headquarters in Los Angeles.

The Eastern service district, including all the territory east of the Mississippi River, is under Frank L. Burgess, service engineer. States between the Mississippi River and the Rocky Mountains compose the central service zone, and are under McLaren Sawyer, service engineer. Carl H. Yackey handles the service on the Pacific Coast. These service engineers are assisted by service mechanics.

V. J. Lowenstein, sales manager, is in charge of the sales and service department. The field men contact with P. G. Sedley, sales promotion manager, at the main office in St. Louis.

New Zealand Market Good

WASHINGTON, July 19—The outlook for heavy sales of automobiles in New Zealand next fall is propitious, according to cable advices to the Department of Commerce and the definite suggestion is cabled that American manufacturers ship September and October requirements as promptly as possible. There is a marked shortage of car stocks universal there, it is reported. Passenger car registrations in June were 1053, and trucks, 23.

Balloon Tire Stocks Show Gain on June 1

Production and Shipments
Gain During May—Cord
Stocks Show Decline

NEW YORK, July 16—Inventories of all types of pneumatic casings as of June, 1928, show an increase above June a year ago and May of this year, according to the statistics just compiled by the Rubber Association of America. Inventories of tubes show an increase over April of this year but are slightly lower than they were in May a year ago. Production and shipments in all groups increased during May as compared with April of this year. Inventories of balloon casings and tubes are greater than a year ago and also greater than April of this year, but inventories of high pressure casings and tubes are lower than they were a year ago. High pressure tubes have a slightly higher inventory than they did in April while casings are a trifle lower.

Comparative figures follow:

	Inven- tory	Produc- tion	Ship- ments
Balloon Casings			
May, 1928....	5,419,093	3,658,349	3,235,236
Apr., 1928....	4,983,023	3,309,351	2,983,454
May, 1927....	4,106,840	2,708,350	2,337,572
Balloon Inner Tubes			
May, 1928....	7,055,801	3,695,296	3,011,432
Apr., 1928....	6,434,307	3,366,957	2,815,778
May, 1927....	5,830,272	2,907,364	2,342,781
High Pressure Cord Casings			
May, 1928....	4,152,775	1,404,097	1,570,710
Apr., 1928....	4,331,499	1,307,759	1,347,854
May, 1927....	4,685,780	1,867,667	1,805,930
High Pressure Inner Tubes			
May, 1928....	6,220,912	1,680,621	1,713,411
Apr., 1928....	6,044,843	1,628,576	1,459,826
May, 1927....	7,962,224	2,145,654	2,262,496

Crude Rubber Price Firmer

NEW YORK, July 16—Crude rubber closed on a stronger tone last week, according to F. R. Henderson Corp., due largely to the situation shown by the Rubber Association figures. These figures show that June consumption was 37,677 tons as compared with 37,333 in May, with stocks on hand at 90,198 tons as compared with 105,356 tons in May.

Imports during June were 25,792 tons as compared with 32,883 tons in May.

Arrivals of crude rubber in New York, according to the Henderson corporation, between July 1 and July 13 were 17,500 tons.

Stocks in London were decreased to a total of 36,915 tons.

Institute Leases Offices

NEW YORK, July 16—The Rubber Institute, recently organized under the leadership of former assistant secretary of the Treasury, General Lincoln C. Andrews, has leased quarters on the 22nd floor at 1776 Broadway for its main offices.

Lancia Makes Units for American Cars

Twin Plant Building 10 Engines Daily for Assembly at Poughkeepsie

NEW YORK, July 17—Anthony M. Flocker of Lancia Motor Sales Corp., who has been in Europe visiting the headquarters of his company for several months, returned to this country on Friday of last week. He reports that production in the Turin plant for the American market is well under way and that his company will have a car ready for exhibition in the Commodore at show time. The Turin plant is now at work on a production schedule of 10 units a day for this market and as soon as the Poughkeepsie plant is ready for operation engines will be shipped through to this country at that rate.

Production in all Italian automobile plants is also now running at its peak for the domestic market, according to Mr. Flocker. The Turin plant of the Lancia company is turning out at present approximately 25 cars a day for the European market, with other companies also running at peak production. Buying interest has been considerably stimulated since the Milan Salon two months ago, there having been a quiet period immediately prior to that exhibit.

There is as yet no real market for low-priced cars in Italy, according to Mr. Flocker, inasmuch as conditions make motoring primarily a rich man's pleasure. Distances within cities are usually too small to require the use of a car and for the most part roads between cities are such as to require riding equipment, such as goggles, dusters and so on. However, there is at present under way a program of highway construction which will make it possible for the larger number of business men to satisfy the growing desire for motor transportation. Concrete and macadam highways are being constructed. These highways are in straight lines with no intersections. Roads crossing the lines of these highways are either under-passed or elevated above the highways by bridges.

Mr. Flocker also commented on the wide use of buses in Italy as compared with this country. Every town and hamlet can now be reached from any other town or hamlet by bus, many of these bus lines replacing former railroad lines which were found to be unprofitable for filling needs which heretofore had not been met.

Chevrolet Adopts New Plug

DETROIT, July 16—Chevrolet Motor Co., due to increased power of its 1928 engine, has adopted a different type AC spark plug, the first spark plug change in its history. The new plug for 1928 Chevrolet models is AC type "Z." All previous models require type "B."

Fargo Express Name of New Truck Entry

DETROIT, July 17—Announcement of its purpose to extend its activities into the commercial vehicle field with a de luxe line of delivery vehicles and buses, to be known as Fargo Express, was made by one of the leading motor car producers today. The identity of this company and details of the product will be made known later. For the present, it is stated that the new Fargo Express is in production and will be ready for delivery in from 60 to 90 days.

Chrysler Stock Increase to 6,000,000 Shares Voted

DETROIT, July 17—Chrysler Corp. stockholders, at a special meeting in Detroit Tuesday afternoon, authorized an increase of capitalization from 3,200,000 shares to 6,000,000 shares of common stock. This includes all shares necessary to carry out the Chrysler-Dodge plan.

All preferred stock of Chrysler Corp. has been called for redemption Aug. 6. As a consequence of this reduction and of the Chrysler stockholders' action in increasing the common stock Chrysler hereafter will have authorized capital of 6,000,000 shares of common stock in one class.

A special meeting of all Dodge Brothers' stockholders will be held July 28 at Baltimore at which they will be asked to vote on the Chrysler proposal. Stockholders are asked to send in their proxies whether or not they have deposited their shares under the agreement.

Fafnir Bearing Builds Large Plant Additions

NEW BRITAIN, CONN., July 16—Fafnir Bearing Co. has contracted for the erection of a new one-story building 120 x 60 ft. and for a 60-ft. addition to an existing six-story wing of the present factory. The new building will house a thoroughly modern hardening department for which new equipment will be provided.

The six-story addition will enlarge the working capacity of several of the manufacturing departments and enable them to handle a larger volume of business more adequately. Plans are also under way for the construction of still another six-story building.

Installs New Machinery

TOLEDO, July 16—The Toledo Machine & Tool Co., one of the leading producers of power presses for the automotive trade, has completed installation of \$150,000 of new, heavy machinery and 30 per cent increase in power plant capacity.

G.M. Export Plans Assembly at Bombay

Plant Will Have Capacity of 100 Cars Daily and Will Begin Nov. 1

NEW YORK, July 18—General Motors Export Co. has established a new assembly plant at Bombay to be known as General Motors India, Ltd. The new operation is the twenty-third of General Motors' overseas subsidiaries and will be in production Nov. 1. Chevrolets, Pontiacs, Oldsmobiles, Oaklands and Buicks will be assembled during the first year of the operation. The capacity of the plant to start will be 100 units a day.

The new operation will be included in the Far Eastern region under the direction of Graeme K. Howard.

G. C. Seers has been named managing director; F. L. Hopkinson, assistant managing director; E. C. Richard, production manager; Stewart Malcolmson, assistant production manager; T. L. Hausmann, sales manager; G. J. Mack, A. M. Wade, F. E. Mengel and G. H. Echols, assistant sales managers; Wynn Cannen, R. C. R. Shand and J. H. Cartwright, sales representatives; C. G. Hogg, truck specialist; G. L. Godden, Vauxhall specialist; R. F. Merrick, advertising manager; L. C. Bryant, assistant advertising manager; John Goddard, plant analyst; F. E. Nestor, service manager; E. J. Minert and E. A. Keeble, assistant service managers; D. S. French and W. S. Graham, service representatives; P. E. Annis, assistant parts manager; C. D. Overman, supply manager, and J. R. McKenzie, treasurer.

Ohio Plant Employment 9 Per Cent Lower in Half

COLUMBUS, July 16—The Bureau of Business Research of Ohio State University in a report covering June employment in the vehicle manufacturing industries of Ohio showed a decline for the first time in seven months. The June index of 85 was 1 per cent lower than May and 4 per cent lower than in June, 1927. Employment during the first half of 1928 was 9 per cent lower than in the corresponding period last year. Of the 59 reporting concerns, 27 showed increases, 27 showed decreases and 5 showed no change, in June, over May.

Employment in Cincinnati during June was 12 per cent larger than in May and 5 per cent lower than in June, 1927. June employment in Cleveland was 3 per cent lower than in May and 13 per cent lower than in June, 1927.

In the Ohio tire industry employment in June was 2 per cent larger than in May this year, but 4 per cent lower than in June, 1927. The increase in employment over May is shared by 16 of the 20 reporting manufacturers.

Detroit Sales Gain 33 Per Cent in Half

DETROIT, July 14—A total of 10,146 new passenger cars were sold in Wayne County during June, according to figures compiled by the Detroit Automobile Dealers' Association. Chevrolet led the field with 2257 sales. Essex was next with 1525, Pontiac 970, Ford 914, Graham-Paige 684, Whippet 584, Buick 419, Dodge Brothers 387, Chrysler 322, Hupmobile 316, and Oldsmobile 304. Passenger car sales for the first six months totaled 42,671 compared with 31,670 in the corresponding period of last year.

Commercial car sales for June totaled 661 units. This brings the sales for this period to 2809 for the first six months, as compared with 3242 in the corresponding period of last year. Ford led the field with 221, Chevrolet 181, GMC 52, Reo 42, Graham Brothers 41, International 19, White 18, Federal 11, and Divco 10.

Studebakers Win Awards

SOUTH BEND, July 16—Two Studebaker Commanders won the highest awards for their class in the recent German Alpenfahrt endurance and speed contest. They were the only cars to complete the test without penalties and as a result were awarded four separate prizes. The race was a six-day tour, with daily tests of roadability, ease of handling, hill climbing and other qualities.

Lupton to Build in Chicago

PHILADELPHIA, July 16—David Lupton's Sons Co., manufacturer of steel windows, has given the Chicago clearing industrial district a contract to erect the first unit of its new manufacturing plant and warehouse there. Six and a half acres of land are held by the company, and the complete plant will be 1000 ft. long and 300 ft. wide.

Coming Feature Issue of Chilton Class Journal Publications

Oct. 10—Marketing Annual for
1929—Motor World Wholesale.

Brantingham Debentures to Get Stock Under Plan

CHICAGO, July 14—Arrangements have been made with the holders of \$5,000,000 Emerson-Brantingham Corp. debentures to take 22,000 shares of class A stock of the company on the basis of \$50 a share in part payment for their debentures, according to a letter which has been sent to stockholders of the company by C. S. Brantingham, president. The stock to be so issued has been authorized but held in the treasury of the company.

The letter also stated that while the company will show a considerable loss in its book value as a result of the sale of the farm machinery assets to the J. I. Case Threshing Machine Co., officials feel that the net results from the sale will be decidedly to the advantage of all stockholders.

Directors of the company have voted to change the fiscal year to end with the calendar year.

G.E. Orders Gain 16%

SCHENECTADY, July 16—Orders received by General Electric Co. for the three months ending June 30 amounted to \$90,431,957, compared with \$78,105,247 for the corresponding quarter of 1927, an increase of 16 per cent, President Gerard Swope has announced. For the six months ending June 30 orders received amounted to \$170,357,797, compared with \$155,655,828 for the first six months of last year, an increase of 9 per cent.

1432 Cars Repossessed in San Francisco Year

SAN FRANCISCO, July 16—The Motor Car Dealers' Association of San Francisco has established, and maintains up-to-date, a complete list of repossessions made by the dealers of this city beginning July 1, 1927. These repossessions include both new and used cars, and show that in the fiscal year ending June 30, 1928, dealers took back 1432 cars.

New car repossessions made up 22 per cent of the total, and used cars, 78 per cent, while 1½ per cent showed more than one repossession from the same person. Of the new car repossessions, 17 per cent were under \$500; 50 per cent between \$500 and \$1,000; 30 per cent between \$1,000 and \$2,000, and 3 per cent above \$2,000.

Used-car repossessions showed, according to Mr. D'Ettel, that 72 per cent were under \$500; 25 per cent between \$500 and \$1,000, and 3 per cent between \$1,000 and \$2,000.

Every 30 days all the new repossessions are listed and sent to members of the association.

Kleiber Adds Space

SAN FRANCISCO, July 16—Kleiber Motor Co. will add approximately 160,000 sq. ft. of factory space. Increase of more than 20 per cent in sales for June, 1928, over those of June, 1927, is announced by Paul Kleiber, president of the company. Approximately 50 per cent of this increase is on sales of trucks from two and one-half tons up.

Reduces Cap Prices

CHICAGO, July 16—Evertite Bolt Co., through use of additional modern machinery and greatly increased production, has reduced the prices of its bearing caps about 25 per cent, effective Aug. 1, this year.

Calendar of Coming Events

SHOWS

American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Road Builders Association, Inc., Cleveland Auditorium...Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia...Oct. 8-12
American Welding Society, Commercial Museum, Philadelphia...Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago...Oct. 22-27
Berlin...Nov. 8-18
Brussels...Dec. 8-19
*Chicago, National, Coliseum, Jan. 26-Feb. 2
Leipzig...Aug. 26-Sept. 1
London, passenger cars...Oct. 11-20
National Standard Parts Association, Cleveland Auditorium...Oct. 29-Nov. 3
*New York, National, Grand Central Palace...Jan. 5-12
Paris, passenger cars...Oct. 4-14
Paris, trucks...Nov. 15-25
Prague...Sept. 1-9
Salon, Automobile Salon, Inc., Hotel Drake, Chicago...Jan. 26-Feb. 2
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles...Feb. 9-16
Salon, Automobile Salon, Inc., Hotel Commodore, New York...Dec. 2-8

* Will have special shop equipment exhibit.

Salon, Automobile Salon, Inc., Palace Hotel, San Francisco...Feb. 23-Mar. 2

CONVENTIONS

American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Gear Manufacturers Association, Statler Hotel, Buffalo, N. Y., Oct. 11-13
American Road Builders Ass'n, Inc., Cleveland Auditorium...Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia...Oct. 8-12
American Welding Society, Commercial Museum, Philadelphia...Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago...Oct. 22-27
Institute of Mining and Metallurgical Engineering, Benjamin Franklin Hotel...Oct. 8-12
National Association of Automobile Show and Association Managers, Before-Shows, Drake Hotel, Chicago...July 26-27
National Highway Congress, Mexico City...Oct. 3-6
National Safety Council, National Congress, New York...Oct. 1-5
National Standard Parts Association, Hollenden Hotel, Cleveland, Oct. 29-Nov. 3

Society of Industrial Engineers, Rochester, N. Y.Oct. 17-19
World Motor Transport Congress, RomeSept. 25-29

A. S. M. E.

Cincinnati, Oct. 22-25—Machine Shop Practice.
Cleveland, Sept. 17-20—Fuels.

S. A. E. National

Chicago, Dec. 6-7—Aeronautic.
Detroit, Book-Cadillac, Nov. 22-23—Production.
Detroit, Book-Cadillac, Jan. 15-18—Annual.
Los Angeles, Sept. 13-14—Aeronautic.
Newark, Robert Treat Hotel, Oct. 16-18—Transportation.
New York, Hotel Astor—Jan. 10—Annual Dinner.

RACES

SpainJuly 29
BelgiumAug. 12
AltoonaAug. 18
SyracuseSept. 1
ItalySept. 2
SalemSept. 8 or 15
Great BritainSept. 22

AUTOMOTIVE INDUSTRIES

THE AUTOMOBILE

Reg. U. S. Pat. Off.
Established 1902

Volume 59

Number 4

NORMAN G. SHIDLE, Directing Editor
JOHN C. GOURLIE, Managing Editor ROBERT L. CUSICK, Ass't Editor
P. M. HELDT, Engineering Editor K. W. STILLMAN, Ass't Editor
D. M. McDONALD, Ass't News Ed. ATHEL F. DENHAM, Field Editor
LEWIS C. DIBBLE, Detroit News Rep. M. WARREN BAKER, Field Editor

Contents

Positions of Parts Companies Strengthened by Mergers. By Norman G. Shidle.....	109
Silver Anniversary Buick in New Dress, Engines are Larger. By A. F. Denham	112
Reducing Gears and Superchargers, Paris Air Show Features. By W. F. Bradley.....	117
Torsional Strength Figures Given for Axle Shafts. By P. M. Heldt	120
Helical Gear Problems Simplified by Graphical Analysis. By Robert P. Lewis	122
Just Among Ourselves	125
The Forum	126
Rubber Joints for Body Paneling is New Development	128
Mechanical Principles of Inclined Knuckle Pivots. By A. L. Vargha.....	130
Nitriding Process is Now Employed to Harden Automobile Parts	132
News of the Industry.....	134
Men of the Industry.....	138
Financial Notes	139
Calendar of Events	144
Advertisers' Index	84, 85

Automotive Industries is published every Saturday by
CHILTON CLASS JOURNAL COMPANY
Chestnut and 56th Streets, Philadelphia, Pa.

C. A. MUSSELMAN, President and General Manager
J. S. HILDRETH, Vice-Pres. and Director of Sales
W. I. RALPH, Vice-Pres. DAVID BEECROFT, Vice-Pres.
G. C. BUZBY, Vice-Pres.
A. H. VAUX
Secretary and Treasurer

JULIAN CHASE, Business Manager
Automotive Industries
Cable AddressAutoand, Philadelphia
TelephoneSherwood 1424

GEO. D. ROBERTS
Advertising Manager

OFFICES

New York—239 West 39th St., Phone Pennsylvania 0080
Chicago—5 South Wabash Ave., Phone Central 7045
Detroit—710 Stephenson Bldg., Phone Northway 2090
Cleveland—540 Guardian Bldg., Phone Main 6860
Indianapolis—519 Merchants Bank Bldg., Phone Riley 3212
Los Angeles—433 Petroleum Securities Bldg., Phone Westmore 9084

Owned by United Publishers Corporation, 239 West 39th Street, New York; ANDREW C. PEARSON, Chairman, Board of Directors; FRITZ J. FRANK, President, C. A. MUSSELMAN, Vice-President; F. C. STEVENS, Treasurer.

SUBSCRIPTION RATES: United States, Mexico and U. S. Possessions, \$3.00 per year; Canada, \$5.00 per year; All other Countries in Postal Union, \$6.00 per year; Single Copies, 35 cents.

COPYRIGHT 1928, CHILTON CLASS JOURNAL COMPANY

Member of the Audit Bureau of Circulations
Member Associated Business Papers, Inc.

Automotive Industries — The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

WYMAN-GORDON

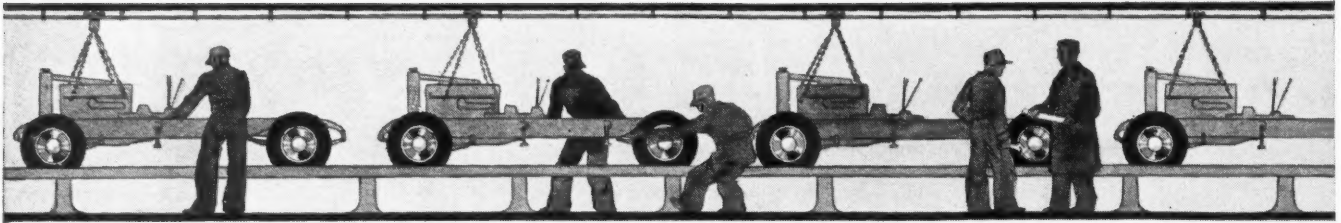


SPECIALIZED equipment and processes for every Crankshaft design

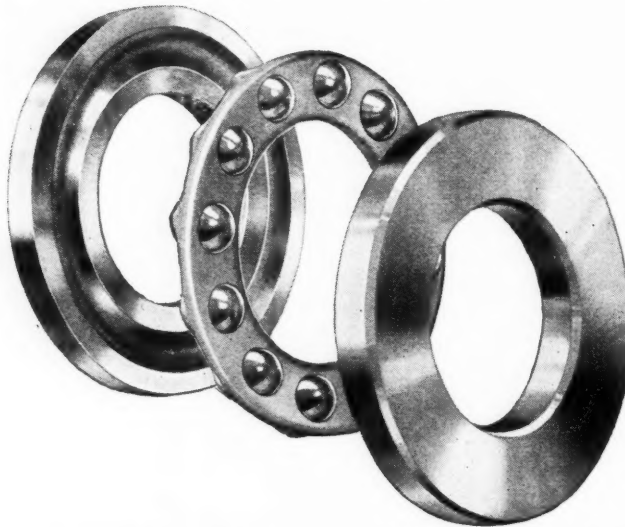


WYMAN-GORDON

The Crankshaft Makers
Worcester, Mass.
Harvey, Ill.



Specialists to an Industry



The Aetna Ball Bearing Company is recognized by the industry as specialists in the manufacture of fine thrust ball bearings. Automotive engineers know Aetna Bearings are second to none from the standpoint of quality. They know from experience that each Aetna Bearing is accurately machined—that the Aetna line of inspections is the most rigid in this field—that every Aetna Bearing which leaves the factory is a masterpiece of manufacture.

In this day of mile after mile of gruelling performance—so much depends on the almost total elimination of friction in those vital parts of chassis, clutch and steering column, that the selection of the correct thrust bearing is in reality more important than the choice of color or change in body design. All the details of fine bearing requirements are recognized by Aetna engineers—and each Aetna bearing must meet the Aetna standard of "precision beyond specifications."

Our Engineering Department stands ready at any time to consult with any manufacturer in the design of special thrust ball bearings—or to quote on Aetna Bearings as standard equipment. Let us send you the latest Aetna Engineer's catalog with complete specifications.

AETNA BALL BEARING MFG. CO.
2745 High Street Chicago, Ill.

AETNA

THRUST BALL BEARINGS

